*Future Administration
of
State of Maryland
Water Resources Activities*

APPENDICES

A REPORT TO THE GOVERNOR

STATE PLANNING DEPARTMENT

MARCH, 1961

STATE PLANNING DEPARTMENT
1103 State Office Building
Baltimore 1, Maryland
Publication No. 112 A

FUTURE ADMINISTRATION
OF
STATE OF MARYLAND
WATER RESOURCES ACTIVITIES

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APPENDICES

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March 15, 1961

Dear Governor Tawes:

The report, Future Administration of State of Maryland Water Resources Activities, has been submitted to you separately.

The Appendices to this report, which I am pleased to transmit herewith, consists mainly of information supplied by the various State agencies with water management responsibilities regarding present policies, programs and organizational structure. The views of these agencies regarding current and emerging problem areas in the water resources management field, as also their long-range objectives and program goals, are included.

This information in combination with field investigations and conferences with State agency directors and their staffs were of inestimable value to the State Planning Department in formulating the recommendations embraced by the report.

Respectfully,

James J. O'Donnell
Director

The Honorable J. Millard Tawes
Governor of the State of
Maryland
State House
Annapolis, Maryland

337630

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GRAMS FUNCTIONS

DEPARTMENT OF RESEARCH AND EDUCATION AND	DEPARTMENT OF FORESTS AND PARKS
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<ol style="list-style-type: none"> 1. Conduct studies and investigations into the commercial tidal water fisheries; nutritive food values, abundance, depletion, production standards, indices of decomposition and contamination, utilization of seafood products and by-products and problems of rehabilitation. 2. Prepare standards, indices of decomposition and contamination, utilization of seafood products and by-products and problems of rehabilitation. 3. Conduct investigations of the State as to their capacity to maintain and develop fish life, including the problems of hatchery, planting and rearing of fish. 4. Investigate food, cover and habitat, with reference to game and bird populations. <p>State Investigate problems of diseases as in cases affecting game and fish.</p> <p>Develop Study pollution and its control in and both tidal and non-tidal water.</p> <p>ways Initiate statistical investigations in cooperation with the several departments administering the natural resources of the State, and with the appropriate agencies of the federal government.</p> <p>Prepare and transmit material in acceptable curriculum form for use in classroom work in the colleges and schools of the State.</p> <p>Present to the public a systematic program of instruction by means of lectures, motion pictures articles and other methods of publicity.</p> <p>Cooperate with research and educational work being done by the United States Bureau of Fisheries, the University of Maryland and the State-aided colleges and institutions.</p>	<ol style="list-style-type: none"> 1. Encourage economic development and use of natural resources for improvement of local economy. 2. Promote, administer and manage all State-owned or leased forest, parks, scenic preserves, parkways, historic monuments and recreation areas. 3. Administer all laws, rules and regulations for above-mentioned areas, and for fire control, roadside trees, and restoration of defrosted or denuded areas. 4. Provide technical advice and assistance to landowners on management of woodlands. 5. Operate State forest nursery.
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<ol style="list-style-type: none"> 1. Surface Biological research and administration to provide scientific information logical and basic facts concerning forests, logical marine life and wildlife. 2. Issue Prepare and transmit material on the permit natural resources of the State. 3. Conduct Hydrographic survey, involving a continuous study of the physical and dams chemical characteristics of the Chesapeake Bay and its tributaries. 4. State Contract research program, involving specific projects supported financially by agencies other than the State of Maryland. <p>Special studies, including Chincoteague Bay Project, Susquehanna Fishery Study, fish supply, clam research, development and propagation of rockfish.</p>	<ol style="list-style-type: none"> 1. Fire prevention and control program for protection of forest land in State. 2. Technical forestry and reforestation program for providing technical advice to landowners regarding conservation practices, including watershed and flood control activities. 3. Conservation reservation program for production of certain tree seedling planting stock grown in State forest nursery. 4. State forest and recreation area management program; land used for research in forestry practices and procedures and to demonstrate practical scientific management of forest land for production of various timber products, watershed management and recreation. 5. Roadside tree protection program.
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SUMMARY OF LEGISLATIVE RESPONSIBILITIES AND PROGRAMS OF STATE AGENCIES WITH WATER RESOURCES MANAGEMENT FUNCTIONS

DEPARTMENT OF GEOLOGY, MINES, AND WATER RESOURCES	DEPARTMENT OF HEALTH BUREAU OF ENVIRONMENTAL HYGIENE	WATER POLLUTION CONTROL COMMISSION	DEPARTMENT OF TIDEWATER FISHERIES	DEPARTMENT OF GAME AND INLAND FISH	DEPARTMENT OF RESEARCH AND EDUCATION	DEPARTMENT OF FORESTS AND PARKS
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Legislative Responsibilities

<ol style="list-style-type: none"> 1. Conduct topographic, geologic, hydrographic and magnetic surveys; preparation of maps. 2. Prepare reports on the extent and character of the State's mineral and water resources. 3. Control appropriation or use of surface and underground waters of the State; control construction and repairs of reservoirs, dams and waterway obstructions. 4. Investigate and recommend plans and policies for the protection of the waterfront and waterways of the State against erosion, and cooperate in carrying out plans for the development of waterfront property and the improvement of the waterways of the State. 	<ol style="list-style-type: none"> 1. Supervise and control waters of the State, insofar as their sanitary and physical condition affect the public health or comfort. 2. Consult and advise on matters pertaining to water pollution. 3. Review and approve plans for water systems, sewage systems or refuse disposal plants. 4. Issue orders for correction or abatement of pollution. 5. Control industrial pollution which may become a menace to the public health. 6. Regulate subdivision of land. 	<ol style="list-style-type: none"> 1. Study, investigate and recommend ways to prevent and eliminate pollution of the waters of the State. 2. Encourage voluntary cooperation by the citizens to maintain and preserve the purity of the waters of the State. 3. Coordinate and stimulate the activities of the several State agencies now concerned with water pollution. 4. Enforce existing laws pertaining to the abatement of pollution of the waters of the State. 5. Recommend standards for sewage or waste effluents discharged into the waters of the State. 6. Establish reasonable water quality standards or criteria for any of the waters of the State. 7. Cooperate with other states and the federal government to regulate or control pollution of any interstate waters. 	<ol style="list-style-type: none"> 1. Supervise, regulate and control the following natural resources of the State within the bounds of tidewater: fish, crabs, terrapins, oysters, clams, and other shellfish. Administer laws relating to the conservation and rehabilitation of tidewater fisheries. 2. Administer provisions of the State Boat Act. 3. Inspect fish, terrapins and shellfish; audit books of dealers. 4. Make surveys and lease grounds for the planting of oysters. 5. Use funds, federal and otherwise, necessary for the rehabilitation and development of the seafood industry. 	<ol style="list-style-type: none"> 1. Restore, establish, maintain, protect and continue game birds, game mammal and inland-water fish populations in the State. 2. Enforce game and fish laws. 3. Administer, in cooperation with Department of Tidewater Fisheries, the State Boat Act. 4. Acquire title to, or control of lands or waters within the State suitable for the protection and propagation of game and fish, or for hunting purposes. 5. Cooperate with federal, State and local conservation agencies. 	<ol style="list-style-type: none"> 1. Conduct studies and investigations into the commercial tidewater fisheries; nutritive food values; abundance, depletion, production standards, indices of decomposition and contamination, utilization of seafood products and by-products and problems of rehabilitation. 2. Investigate waters of the State as to their capacity to maintain and develop fish life, including the problems of hatchery, planting and rearing of fish. 3. Investigate food, cover and habitat, with reference to game and bird populations. 4. Investigate problems of diseases as affecting game and fish. 5. Study pollution and its control in both tidal and non-tidal water. 6. Initiate statistical investigations in cooperation with the several departments administering the natural resources of the State, and with the appropriate agencies of the federal government. 7. Prepare and transmit material in acceptable curriculum form for use in classroom work in the colleges and schools of the State. 8. Present to the public a systematic program of instruction by means of lectures, motion pictures articles and other methods of publicity. 9. Cooperate with research and educational work being done by the United States Bureau of Fisheries, the University of Maryland and the State-aided colleges and institutions. 	<ol style="list-style-type: none"> 1. Encourage economic development and use of natural resources for improvement of local economy. 2. Promote, administer and manage all State-owned or leased forest, parks, scenic preserves, parkways, historic monuments and recreation areas. 3. Administer all laws, rules and regulations for above-mentioned areas, and for fire control, roadside trees, and restoration of defrosted or denuded areas. 4. Provide technical advice and assistance to landowners on management of woodlands. 5. Operate State forest nursery.
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Programs

<ol style="list-style-type: none"> 1. Surface water surveys and stream gaging; ground water surveys; geological surveys; topographic and geological mapping. 2. Issue annual well driller licenses, permits to drill wells and permits to use and appropriate water. 3. Control construction and repair of dams and reservoirs; approve farm pond construction notices; represent State at hearings on navigation improvements held by U. S. Army Corps of Engineers. 4. Shore erosion investigation. 	<ol style="list-style-type: none"> 1. Review and approve plans and specifications for new water supplies and changes to existing water supplies. 2. Review and approve plans and specifications for new sewerage systems and changes to existing systems; assist communities in securing financial aid through public funds now available. 3. Enforce subdivision regulation of State Board of Health. 4. Review and approve plans and specifications for all new swimming pools and changes to existing pools. 5. Water quality survey and study program in cooperation with Water Pollution Control Commission. 	<ol style="list-style-type: none"> 1. Conduct investigations, inspections and studies to discover and define sources of all industrial and commercial waste discharge to Maryland waters; insure compliance with orders the Commission may issue. 2. Provide chemical, physical, and biochemical analysis of all water and waste materials in the investigations and inspections of waste discharges and water conditions. 3. Water quality survey and study program in cooperation with Department of Health. 	<ol style="list-style-type: none"> 1. Growing and planting of seed and heavy planting of shells on public rocks. 2. Studies relating to shad and rock and other kinds of fish. 3. General survey of the Bay and its tributaries and surveys of bottoms; surveys for the leasing of oyster bottoms. 4. Dissemination of marketing information to maintain and expand seafood markets. 5. Inform watermen respecting developments in the seafood industry. 6. Enforcement of all tidewater laws and State Boat Act. 7. Development of harbors, cleaning of streams, fostering of regattas and other water sports publicizing recreational areas and developing new ones. 	<ol style="list-style-type: none"> 1. Cooperate with landowners, federal, State, and local agencies in developing water resources for use of various forms of wildlife. 2. Provide current information pertaining to wildlife, and to educate the public about conservation of natural resources. 3. Cooperate with the Soil Conservation Service in seeding and planting soil banks of drainage projects and farm pond watersheds with food and cover plants for wildlife and erosion control. 4. Cooperate with other state and federal agencies in studying current problems of tidewater environment which may affect wildlife, particularly waterfowl. 5. Acquire sites and construction of water impoundments whenever practical to support fish populations. 6. Enforce game and fish laws, and the State Boat Act. 	<ol style="list-style-type: none"> 1. Biological research and administration to provide scientific information and basic facts concerning forests, marine life and wildlife. 2. Prepare and transmit material on the natural resources of the State. 3. Hydrographic survey, involving a continuous study of the physical and chemical characteristics of the Chesapeake Bay and its tributaries. 4. Contract research program, involving specific projects supported financially by agencies other than the State of Maryland. 5. Special studies, including Chincoteague Bay Project, Susquehanna Fishery Study, fish supply, clam research, development and propagation of rockfish. 	<ol style="list-style-type: none"> 1. Fire prevention and control program for protection of forest land in State. 2. Technical forestry and reforestation program for providing technical advice to landowners regarding conservation practices, including watershed and flood control activities. 3. Conservation reservation program for production of certain tree seedling planting stock grown in State forest nursery. 4. State forest and recreation area management program; land used for research in forestry practices and procedures and to demonstrate practical scientific management of forest land for production of various timber products, watershed management and recreation. 5. Roadside tree protection program.
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APPENDIX A

INSTRUCTIONAL OUTLINE

WATER RESOURCES MANAGEMENT STUDY

Instructional Outline For Basic Information To Be Supplied By
Participating State Agencies

ISSUED - March 18, 1960

The information requested in the following outline specification is to be supplied only in connection with those areas of an agency's operations relating in one way or another to water resources management. In order to minimize the need for supplemental information, it is suggested that the report be prepared with the utmost thoughtfulness and buttressed with whatever detail as may seem essential. Kindly file with State Planning Department not later than June 1, 1960.

I. LEGISLATIVE AUTHORITY AND RESPONSIBILITIES

- A. Legislative authority and other pertinent laws or directives
- B. Major responsibilities as prescribed by law
- C. Other relevant information

II. PRESENT POLICIES AND PROGRAMS AND RELATED ORGANIZATIONAL SET-UP

- A. Statement of present policies
- B. Description of various programs now being carried out to effectuate policies of the agency and to discharge responsibilities under the law.

NOTE: In discussing operations of the agency in the water resources management field, include information regarding inter-agency and inter-governmental (federal, inter-state and local) operations and relations

- C. Description of organizational set-up as related to "B," above

III. PRESENT AND EMERGING PROBLEMS

- A. Delineation of present and emerging problem areas in the water resources management field

NOTE: Cite and evaluate also problem areas not as yet clearly evident, but which likely will require future study and remedial action.

IV. LONG-RANGE OBJECTIVES AND PROGRAM GOALS

- A. Statement of long-range (10-15-20 years) objectives
- B. Revision of present and initiation of new policies and programs required for the achievement of long-range objectives

NOTE #1: Such policies and programs should, of course, take importantly into account the problems discussed in "IIIA," above

NOTE #2: Indicate also any recommended top-level administrative or legislative action

V. DATA COLLECTING, RESEARCH AND PLANNING

- A. Listing and description of data collecting activities
- B. Description of current and projected research
- C. Description of planning operations, if any

APPENDIX B

REPORT OF THE DEPARTMENT OF
GEOLOGY, MINES AND WATER RESOURCES

Legislative Authority and Responsibilities

Maryland Geological Survey

Chapter 51, Laws of Maryland 1896, established a State Geological and Economic Survey "for the preparation and publication of reports and maps to illustrate the natural resources of the State, together with the necessary investigations preparatory thereto." The Survey was known as the Maryland Geological Survey.

In 1918, the Maryland Geological Survey published a report on "The Surface and Underground Water Resources of Maryland, including Delaware and the District of Columbia." The report described the relations of the principal aquifers in each county to the geology of the county and compiled available well records and well logs and analyses of the waters.

In 1930, the Maryland Geological Survey prepared an atlas of the 15-minute topographic quadrangles covering Maryland on which were placed the locations of all wells for which records had been obtained.

Water Resources Commission

Chapter 526, Laws of Maryland 1933, declared it "the policy of the State to control, as far as practicable, the appropriation or use of surface and underground waters of the State; to control the construction, reconstruction and repair of reservoirs, dams and water-way obstructions in any of the waters of the State." A Water Resources Commission was established to administer the Act.

The Act requires a permit to appropriate or use surface water and underground water and to construct a dam or reservoir.

Exempted from the control of the Act are the appropriation or use of water for domestic and farming purposes, for an approved water supply of any municipality, riparian rights, and any particular use in existence on January 1, 1934, provided such use is not thereafter abandoned; and the construction of a dam or reservoir which is ten feet or less in height and which has a storage capacity of less than one million gallons.

Department of Geology, Mines and Water Resources

Section 12A, Chapter 508, Laws of Maryland 1941, created the Department of Geology, Mines and Water Resources into which were merged the Water Resources Commission and the Water Front Commission.

The jurisdiction of this Department in the fields of water resources and water management as set forth in Section 12B is:

- A. Preparation of reports on the extent and character of the State's water resources.
- B. Control, as far as practicable, of the appropriation or use of surface and underground waters of the State, and the control of the construction and repairs of reservoirs, dams, and waterway obstructions.
- C. Investigation and recommendation of plans and policies for the protection of the waterfront and waterways of the State against erosion; and cooperation necessary for carrying into effect plans for the development of the waterfront property and the improvement of the waterways of the State.

(A) embraces the functions of the predecessor Maryland Geological Survey, (B) the functions of the predecessor Water Resources Commission and (C) the functions of the predecessor Water Front Commission. The latter was established in 1929, but had issued only one report in 1933 pertaining to shore erosion effects of the 1933 hurricane.

Extent and Character of State's Water Resources

Surface Water Resources Investigations

In cooperation with the U. S. Geological Survey, gaging stations are maintained to measure stream flows. The stations are distributed over the

State to obtain coverage geographically, physiographically, and by stream sizes. In 1959 stream flows were being measured at 86 gaging stations. A compilation of all records up to 1943 was published in 1944. Later records have been published in the series of County Water Resources reports. The records are published annually also by the U. S. Geological Survey.

Low flow and flood flow duration curves are being prepared for the streams of the State under a three-year cooperative project with the U. S. Geological Survey during the fiscal years 1959, 1960 and 1961.

Stream flow measurements are a continuing project yielding cumulative quantitative information on the flow characteristics of the streams of the State.

Ground Water Resources Investigations

An intensive investigation and inventory of the ground-water resources was initiated in 1942 in cooperation with the U. S. Geological Survey. This project has been carried on county by county and completed coverage of the State in fiscal year 1960. The results have been presented in a series of county reports covering all but two of the counties. The results for Allegany and Washington Counties will be published in fiscal year 1961. These reports provide the essential data for management of the appropriation and use of the ground-water resources of the State for their "proper conservation, allocation and development for the best interests of all of the people of Maryland" (Section 719, Article 66C, Annotated Code 1957).

Chapter 325, Laws of Maryland 1945, requires well drillers to be licensed and to obtain a permit to drill a well and to file a completion report on the well, giving the log of the well and the static water level and the drawdown at a specified rate and duration of pumping. The nearly 39,000 such well records now in the files of the Department have provided invaluable hydrologic data for the State-wide investigation of the ground-water resources.

Of the order of 4,000 such records are added annually, continuously augmenting data on the ground-water resources.

With the completion of the State-wide general inventory of the ground-water resources, the future program of the Department is to obtain more precise quantitative determinations of the hydrologic properties of aquifers in critical areas of rapidly increasing ground-water requirements. Such a project is being carried on during the fiscal years 1960 and 1961 at the request of and in cooperation with the Anne Arundel County Zoning and Planning Commission to enable the Commission to zone the County on the basis of available ground-water resources into areas suitable for industries requiring large quantities of ground water, areas suitable for industries requiring only moderate quantities of ground water, and areas in which the ground water may be adequate only for domestic uses. A similar investigation is critically needed in Charles County because of the ever increasing ground-water needs at the Naval Propellant Plant at Indian Head and the problem of an adequate ground-water supply for La Plata.

Another pressing problem is that arising from heavy pumpage from the Piney Point aquifer at the Patuxent Naval Air Test Station in St. Mary's County and in the Cambridge area in Dorchester County. The cones of depression at these two centers of heavy pumpage are merging under the Chesapeake Bay and lowering the hydrostatic head in the aquifer under the Bay. This can ultimately result in salt water contamination of the aquifer. The effects of rapidly increasing ground-water withdrawals along the Atlantic Coast need attention to guard against salt water encroachment into the aquifers underlying that area. Other now less pressing critical areas will become more critical in time as population and per capita consumption increase and industrial development expands.

Control of the Appropriation of the Waters
of the State

Exemptions from Control

The management of the appropriation or use of the waters of the State under the policy of control by the State "in the interest and welfare of the people of the State" was adequate and satisfactory until recently when the practice of irrigation was initiated. The appropriation of water for domestic and farming purposes had been equivalent to appropriation for domestic purposes - namely for the household, for watering stock and for watering home lawns and gardens. Riparian rights are limited to, but unrestricted for domestic purposes. The formerly superfluous exemption for farming purposes has created a gap in the completeness of water use management in Maryland. Yet because of this exclusion from the benefits and advantages that would be obtained under the water-management policy of the State, the irrigator is the only user of the waters of the State with uncertainty about his water supply and uncertainty about his water rights. That the only water supply and water rights problems in Maryland arise from the unrestricted exemption of farming uses beyond those embraced under domestic purposes and that those problems would be solved automatically by closing the gap that irrigation has created in the sufficiency of the Maryland law has been explained by the Department of Geology, Mines and Water Resources and set forth in two hereto appended expositions entitled "Maryland's Water Resources and Maryland's Control Over Their Use" and "Maryland Law on the Use and Appropriation of the Waters of the State."

To complete satisfactorily management of the appropriation of the waters of the State, there is needed no more than an amendment to the 1933 law which would substitute for the phrase "domestic and farming purposes" the words "domestic purposes" and to conform the definition of "domestic purposes" to embrace "use for the home, for watering stock, and for watering home lawns and gardens," thereby controlling the use for irrigation in accordance with the

interests and welfare of the people of Maryland. Fear that such control would be restrictive of quantity available for and allowable for irrigation is wholly gratuitous. Actually it would expand both quantity and availability of water for irrigation by permitting the State to allocate water for irrigation use that now runs to waste and to allocate surface water for irrigation use to non-riparian landowners. The control would be exercised solely as orderly management of abundantly available water resources.

Federal Agencies Within the State

Federal agencies consider themselves not subject to control of their appropriation and use of the waters of the State. This is a problem besetting all of the States. With the increase in number and size of Federal agencies, it is a growing problem. Because of its geographic position, the problem will become increasingly critical in Maryland. It has been widely advocated that Congress enact a law requiring Federal agencies to comply with State water management controls.

The Naval Propellant Plant at Indian Head serves as an example of how a Federal agency can upset State management of its water resources. The increasing needs for ground water at this plant can no longer be supplied from wells on the property and various plans for bringing additional ground water to the plant have been considered. A United States Government railroad crosses fourteen miles of Charles County. Consideration has been given to locating wells along this right-of-way. Obviously, State management of appropriation of the ground-water resources in this portion of Charles County would not protect the interests and welfare of the people of Maryland, but merely make practicable increased uncontrolled appropriation by the Federal agency.

It is highly desirable that Maryland's Congressional Representatives be urged to press for legislation requiring Federal agencies to comply with State control in their appropriation and use of water resources.

Water resources management by this Department is a continuing program of processing applications for permits to appropriate and use the waters of the State and to issue permits that safeguard the interests and welfare of the people of Maryland.

Control of Construction of Dams and Reservoirs

Exemption from Control

The purpose of control over the construction of dams and reservoirs is to safeguard the public against the hazards of impoundments of water. Accordingly, exemption is granted to dams ten feet or less in height and which impound less than one million gallons of water (Section 721 (a), Article 66C, Annotated Code 1957).

Farm Ponds

The regulations under which formal permits are issued were considered too onerous and too severe for the U. S. Department of Agriculture's farm pond program, so that Section 721 was amended in 1950 by the addition of Section 721 (b), providing for farm ponds with a water area not to exceed 60,000 square feet and in 1957 by the addition of Section 721 (c), providing for farm ponds with a water area not to exceed 5 acres. Each of these subsections prescribe specifications that must be complied with. Plans and specifications are submitted to this Department with a Farm Pond Construction Notice. If found to conform to the restrictions in the pertinent subsection, the Department issues a Construction Approval.

This program is a continuing administrative function exercised as prescribed in the 1933 law and in the 1950 and 1957 additions to the law.

Shore Erosion Protection

Erosion Protection Recommendations

The results of an investigation of shore erosion along the entire Tidewater shores of Maryland were published by this Department in 1949. The report describes the amount of erosion that occurred during the preceding 100 years along the shores county by county. During these 100 years, Tidewater Maryland incurred an average annual loss of 326 acres, ranging from an average of less than 2 acres a year in Caroline County to an average of more than 80 acres a year in Dorchester County.

The Department investigates erosion and makes recommendations for erosion protection construction upon request of owners of eroding shore fronts. In fiscal year 1959, reports were made on twenty-one such investigations. Since this service was inaugurated in 1947, the Department has made 159 investigations of specific shore fronts subjected to erosion.

This is a continuing program in response to requests for protection construction recommendations. In this program the Department is in liaison with the Beach Erosion Board and the District Engineer, Corps of Engineers, U. S. Army.

Financing of Construction

Federal aid is available to the extent of one-third of the construction cost for publicly-owned shore fronts for projects approved by the Beach Erosion Board, Corps of Engineers, U. S. Army. Liaison for such projects is established through the Department of Geology, Mines and Water Resources. The State's matching two-thirds is channeled through this Department. It may be contributed by the State or by intra-State agencies.

Within the State, financial aid is available at county level (Article 25, Sections 161-167, Annotated Code 1957) for erosion prevention construction along the shore front of an area subdivided for residential and business uses.

Such construction may be undertaken by County Commissioners upon request of 75 percent of the property owners of a subdivision. The cost is recovered by annual assessments against the beneficiaries to amortize the bonds issued to pay for the works.

Chapter 122, Laws of Maryland 1959, authorized the County Commissioners to contribute up to 25 percent of the cost of any erosion control projects and to receive contributions from Federal, State and intra-State agencies for any part or all of the remainder.

The Department's participation in such projects is only to recommend the kind of prevention works needed in the particular projects. The installation of the recommended construction depends on the voluntary assumption of the cost by at least 75 percent of the beneficiaries.

Waterways Improvements

Navigation control and waterways improvement on navigable waters are under Federal jurisdiction which is exercised by the Corps of Engineers, U. S. Army. Federal funds are made available by Congress for projects approved by Congress under a formula requiring the estimated benefits to general navigation to equal the estimated costs. Purely local navigation benefits and other local benefits are excluded. A project can be approved if a deficiency in benefits over costs is contributed by the State or by intra-State agencies.

This Department has since 1945 represented the State at hearings on navigation improvements held by the Corps of Engineers and has reviewed on behalf of the State reports on such improvements submitted to Congress by the Corps of Engineers. The number of hearings and reports varies from year to year with Federal budget provisions for navigation improvements.

In 1945, this Department recommended to the Governor that the State take cognizance of the problem of the shallowing of the tributary waters of the Tidewater counties (in part being silting up of the body of water itself and

in part being the closing up of the outlet) and give consideration to a policy of State aid to the extent of matching local contributions in such cases where the benefits admissible under Federal law do not equal the cost of the project and an additional contribution is required to obtain approval of the project. It was recommended the tax on gasoline that is refunded to boat owners be retained by the State and applied to State aid to navigation improvements of the lesser waterways of the State. Specific legislation sponsored by this Department was Senate Bill 448 in 1951, and Senate Bill 162 in 1953. An identical bill, substituting the Department of Tidewater Fisheries for the Department of Geology, Mines and Water Resources, was House Bill 602 in 1955. A similar bill was Senate Bill 63 in 1959. All of these bills failed of enactment primarily because of opposition to the repeal of the exemption from the gasoline tax to finance the State participation.

Summary

The functions of the Department of Geology, Mines and Water Resources in the broad fields of water resources that come under its statutory responsibilities are investigation, management and public service.

The investigations of the Department have established the magnitude of the water resources of the State and have determined the conditions under which they are available and may be made available. Future investigations will be directed to more precise quantitative determinations in areas of increasing demand to guide long-range, sound development of the water resources of such areas in conformity with the rates of replenishment and manner of their availability. When and in what order such areas are chosen for investigation will depend on the urgency of the need and the funds that are made available. Both surface and ground-water investigations are carried on in cooperation with the United States Geological Survey. The cumulative information on the water resources affords the basic data for providing information regarding water

supply to inquiries for such information.

The cumulative knowledge of the water resources affords the necessary information to assure that permits issued to appropriate and use waters of the State conform to the policy of the State to control the appropriation and use of the waters in accordance with the welfare of the people of Maryland. The only gap in this control is the existing exemption from the policy of the use of water for irrigation. The gap should be closed by the recommended amendment of Section 720, Article 66C, Annotated Code 1957. Maryland's representatives in Congress should be urged to support legislation by Congress requiring Federal agencies to conform to State laws regulating the use and appropriation of water.

Control over the construction of dams and reservoirs is a continuing administrative function to safeguard against the hazards of impoundments of water. Existing legislation is satisfactory and adequate.

Shore erosion investigations are a continuing public service in the Tidewater counties. Federal financial aid is channeled through this Department as the legally authorized State agency in this field. On the State level, the Boards of County Commissioners are the duly authorized agency to receive financial aid from Federal, county and intra-county sources, under Article 25, Sections 161 to 167, Annotated Code of 1957 and Chapter 123, Laws of Maryland 1959.

Navigation improvements are under the jurisdiction of the Corps of Engineers and provided for by Federal funds. Only general navigation benefits can be considered in determining the eligibility of projects for Federal funds, which results in exclusion of lesser waterways in which there are appreciable development benefits that can be obtained only through State and intra-State financial contributions. The enactment of the proposed 1951 Senate Bill 448 to utilize the gasoline tax now refundable to boat owners for financial aid from

the State would facilitate the utilization of the lesser waterways of the State and the development of their shores.

Joseph T. Singewald, Jr., Director

April, 1960

Two supplements attached.

Attachment 1MARYLAND LAW ON THE USE AND APPROPRIATION
OF THE WATERS OF THE STATE

In 1933, the Legislature enacted a Water Resources Act declaring it the policy of the State to control the appropriation and use of the waters of the State "for the best interests of all of the people of Maryland." The Act made it unlawful to appropriate or use any of the waters of the State without a permit from the Department of Geology, Mines and Water Resources (until 1941 the Water Resources Commission). The Act exempted from this control the use of water for domestic and farming purposes or for any approved water supply of a municipality. The Act provided that this control shall not be construed to impair "any riparian or other vested right or to any particular use in existence on January 1, 1934, provided such use is not thereafter abandoned," (Sections 718-734, Article 66C, Annotated Code 1957).

The specific exemption of riparian and vested rights was no more than an affirmation of the recognition of established common law under which these rights are property rights. All uses in effect on January 1, 1934, so long as not thereafter abandoned, were made equivalent to vested rights. An opinion from the Attorney General ruled that "an approved water supply of a municipality" in the meaning of the law is "a municipally-owned and operated water supply" and not a privately-owned and operated water supply for a municipality.

Thus, the only terms in the law that require definition to correctly understand and interpret the scope of the law are domestic uses and riparian rights. Applied to surface waters these terms are equivalent. Thus C. E. Busby, the authority on water rights of the U. S. Department of Agriculture, in defining the scope of riparian rights in the volume on Water in the Yearbook of Agriculture, 1955, U. S. Department of Agriculture, wrote: "Although a certain landowner may exhaust the stream to satisfy his natural domestic needs,

which include water for the household, family farm animals, poultry and other livestock, and the family garden or lawn, other users are limited to a so-called reasonable share for artificial needs, such as for irrigation." He wrote further: "What is a reasonable use of the common supply of one in relation to that of the others? Our courts say that depends on the circumstances surrounding the case." He made clear that "the landowner does not own the water in the stream - nor does anyone else. Many farmers do not understand this point." Thus he points out: "Often in the final analyses, he must go to court to have a jury determine his use as it may affect the use of others."

In the humid States like Maryland, in 1933, there was no use of water for irrigation. All farm uses were embraced under the definition of domestic uses. The legal determination of reasonable use in each case, the Act delegated to a Commission that by means of a permit assured the intended user beforehand that his proposed use would be a reasonable use "for the best interests of all the people of Maryland," and saved those who made use of water for "artificial needs" uncertainty as to the reasonableness of the use until their use may have been decided later in court by inexperienced juries. The subsequently introduced practice of supplemental irrigation in Maryland has brought about a use of water for farming purposes that is not included in the unrestricted domestic use under riparian rights, but is an artificial use restricted to what is reasonable use of the common supply. At the same time, the exemption of the use of water for farming purposes, makes unavailable to the irrigator the procedure prescribed in the Act to determine beforehand whether his use will be reasonable use of the common supply.

This unforeseen legal dilemma of the irrigator is remedied easily by a simple amendment to the Act by striking out the exemption "for domestic and farming purposes" and inserting in its place exemption of "natural domestic needs which include water for the household, family farm animals, poultry, and other livestock, and the family garden or lawn."

Recently, the Director of the Department of Geology, Mines and Water Resources was invited to discuss in the light of the 1933 Water Resources Act a list of fourteen questions entitled "Water Problems and Needs that May Have Legal Implications" which it was suggested may be clarified by appropriate legislation. They serve admirably and comprehensively to illustrate the adequacy and satisfactoriness of the Act except for the irrigator, whose legal problems would be solved by the simple amendment that has been suggested. The problems and their answers are:

1. One riparian owner wishes to use water from a stream for irrigation. A downstream owner is concerned over what effect the reduced flow in the stream may have on his rights.

The Act specifically protects the riparian and other vested rights of every downstream owner.

2. The water supply for a mill or industry is reduced due to upstream use of water for irrigation or other purposes.

The water supply of the mill or industry, if it was in use on January 1, 1934, is a vested right specifically protected in the Act. If the use arose subsequently, the mill or industry has a permit which recognized the use as a reasonable use of the common supply. Under the existing Act only a jury can decide subsequently what is reasonable use for each under the new circumstances in the case. Under the suggested Amended Act the experienced administrative Commission would decide beforehand what is reasonable use of the common supply by each party.

3. Several farmers wish to irrigate from the same stream. The normal summer flow of the stream is not sufficient to meet the needs of all.

There is only one way in which all can supply their needs. Storage "in reservoirs during seasons of high rainfall and runoff is

imperative if demands are to be met in the dry seasons." That total stream flow is many times more than adequate, the flow of the streams in Frederick County demonstrates. The mean monthly flow of those streams is 16 times the lowest monthly flow and the flood flow is 400 times the lowest monthly flow.

He who does not store during periods of excess flow, under the existing Act, can be assured only of his reasonable share of the inadequate supply by a jury. Under the suggested Amended Act, the experienced administrative Commission would determine what is the reasonable share of each farmer out of the inadequate summer flow.

4. A municipality obtains its water supply from a reservoir created by damming a stream. Industrial, agricultural, and recreational users of water above and below the reservoir are concerned over the effect the use of water by this municipality will have on their rights at present and in the future.

The Act specifically protects all riparian and vested rights on the stream above and below the dam. Insofar as a municipality may need to impair these rights, it must and does purchase them or failing in voluntary sale purchases them by condemnation.

5. A farmer wishes to use water from a stream running through his property to irrigate some newly-purchased land that does not border on the stream. Does his right extend to the use of water on this newly-acquired land?

That he has no such right is explicitly explained by Mr. Busby: "Once the land is completely severed by lawful means from access to the body of water, it may never again under the common law recover water rights in the natural water course. That is a basic point that makes the riparian system ever contracting, never expanding." Under the

suggested Amended Act a permit could be obtained for a reasonable share of that great surplus under the control of the State that is not usable under riparian and other vested rights.

6. Part of a riparian owner's farm lies outside the watershed of a stream. Can he use water from the stream to irrigate this land outside the watershed?

Mr. Busby answered this question also: "Streams may not be diverted from one watershed to another under the common law. That further narrows down the opportunity for land owners to obtain a suitable water supply to meet their expanding needs, particularly for irrigation."

The surplus water under the control of the State under the policy of the Act can be so allocated. Under suggested Amended Act, the irrigator could obtain such allotment of water.

7. A landowner has springs originating on his property. What are his rights to the use of water from these springs?

Springs are discharging ground water. Hydrologically, springs and flowing wells are equivalents. Both are merely outlets lower than the level of hydrostatic equilibrium in the aquifer discharging the water. His rights to the use of water from the springs are the same as his rights to the use of water from wells. Practical proof of this is that the landowner could drill a well alongside the spring and by pumping the well create a cone of depression that lowered static water level below the spring level. The spring would go dry and the water would be discharged instead from the well.

8. What are the rights of landowners to impound diffused surface water running over their property after rains and melting snows?

The well established farm pond program of both Federal and State agricultural agencies suffices to allay any doubt about such rights.

That water is neither ground water nor stream flow and is not subject to the riparian or other vested rights of any other landowner. There is no need to restrict existing unlimited rights to the appropriation and use of diffused surface water.

9. An industry pollutes the water of a stream making it unsuitable as a source of water for livestock or recreation.

This would constitute a clear violation of riparian rights of downstream landowners. It is also a violation of existing laws under the administration of the Health Department and/or Water Pollution Control Commission. Such a problem is merely a law enforcement problem.

10. One landowner digs a deep well and the large quantity of water pumped from this well affects other wells in the immediate neighborhood.

Because the use of water for irrigation is exempt from control under the existing Act, every landowner is free to appropriate ground water under the unrestricted "law of capture," without regard to the correlative rights of others to the common supply in the underground reservoir. Even those whose appropriation and use is subject to the correlative rights of others under the existing Act have no protection against appropriation under the "law of capture" for irrigation use. The suggested Amended Act would bring the appropriation and use of ground water by all users, other than for domestic purposes, in conformity with correlative rights of all landowners to the common ground water supply in the reservoir.

11. A landowner wishes to construct a pond in which to store water for several useful purposes. He is blocked from getting permission to build a pond because a downstream landowner will not give the consent required under present law.

The 1933 Act does not require the consent of a downstream landowner to get permission to build a pond. Section 721 exempts from any control whatever the construction of a dam or reservoir in which the maximum depth of water is less than ten feet and the water impounded does not exceed one million gallons. If the depth of water is more than ten feet or the impounded water exceeds one million gallons, consent of the downstream landowner is not required to obtain permission to build the pond. Subsections (b) and (c) provide merely that ponds conform to the restricted specifications in those two subsections may be built without a permit by merely filing a Farm Pond Construction Notice, if the consent of the downstream landowner is obtained.

12. A landowner wants to build a dam across a stream and store water during times of surplus for use during times of low stream flow. Can downstream owners require him to release any of this water?

No landowner at any time has any right or claim whatever to water in excess of the natural flow of a stream at that time no matter what his riparian or other rights may be. It is true there has been no Maryland court decision on this question, but the answer is so obvious as to make court decision or specific legislation wholly superfluous.

13. A landowner hesitates to make investments due to uncertainty of his right to use water.

The only uncertainty under the existing law is the use of water of irrigation. The suggested Amended Act would remedy the uncertainty.

14. Industry refuses to locate in an area due to inadequacy or uncertainty of legally obtaining the needed water supply.

Industry has no need to locate in an area where the needed water supply is inadequate. Industry selects its location in an area where the needed water supply is adequate. No legislation can compel an

industry to locate in an area where the water supply may be inadequate for its needs.

Industry is protected against uncertainty of legally obtaining its water supply under the existing Act, except for such uncontrolled appropriation for irrigation use as may arise. Actually no such uncertainty has yet occurred as a result of uncontrolled appropriation for irrigation use. Future uncertainty would not arise under the suggested Amended Act.

Conclusion

The foregoing problems are thus without definitive answers only to those who are unaware of the magnitude of Maryland's water resources and of the geologic and hydrologic conditions under which they are available for appropriation and use and who are unaware of existing common law and the 1933 Act and of their scope and of their limitations. Insofar as any of these problems are real, the problems exist only because of the exemption of the appropriation of water for irrigation. Moreover, they are primarily and most seriously problems that beset only the irrigator resulting from his exemption from the control of the appropriation and use of the waters of the State "for the best interests of all of the people of Maryland." Amendment of the law to remove this exemption will restore the Act to the satisfactory completeness that existed before the practice of supplemental irrigation was initiated in Maryland.

Joseph T. Singewald, Jr., Director
Department of Geology, Mines and Water Resources

February, 1960.

Attachment 2

MARYLAND'S WATER RESOURCES

AND

MARYLAND'S CONTROL OVER THEIR USE

by

Joseph T. Singewald, Jr., Director
Department of Geology, Mines and Water Resources

Maryland's Water Resources Control

In 1933, Maryland asserted control over the appropriation or use of the surface and underground waters of the State "in order to conserve, protect and utilize the water resources of the State in accordance with the best interests of the people of Maryland."

The Act was administered by a Water Resources Commission, which in 1941 was merged into the existing Department of Geology, Mines and Water Resources.

The Act requires a permit to appropriate or use water and a public hearing on applications for permits. The authority granted the Department in the exercise of the control reads:

"If the Commission shall be of the opinion from all of the evidence before it that, in the pursuance of the policy of the State regarding its water resources herein declared, the plans of the applicant provide for the greatest practical utilization of the waters of the State and will promote the general public welfare, it shall grant the permit to appropriate or use the waters. But if the Commission is of the opinion, from the evidence before it, that the proposed appropriation or use of State waters is wasteful or will be detrimental to the best public interest, the Commission may reject such application or it may suggest such modifications as it deems sufficient to protect the public welfare. In granting any permit authorizing any use or appropriation of water, the Commission may include in the grant thereof such conditions, terms and reservations with respect to the character, amount, means and manner of such use as it may deem reasonably necessary to preserve the proper control in the State and to insure the safety and welfare of the people of Maryland."

Decisions of the Commission may be appealed in the Circuit Court of the Counties and carried to the Court of Appeals, assuring the administration of the Act in accordance with the declared policy of the State.

The Act provides further that it "shall not be construed to impair any riparian or other vested right." The Act does not define the extent or the limitation of riparian rights.

The Act exempts from control the appropriation or use of water for domestic and farming purposes. In Maryland, as in the other eastern humid States, in 1933 farming and domestic uses were coextensive with domestic use as recognized under riparian right - namely, "uncontrolled use of water for the household, family farm animals, poultry, and other livestock, and the family garden and lawn." The use of water for crop irrigation in the eastern humid states was then wholly unforeseen. The recently introduced practice of crop irrigation is an appropriation and use of the waters of the State that is not a riparian right and yet not within the orderly control provided for in the 1933 Act.

Magnitude of Maryland's Water Resources Versus Water Consumption

Water is the only replenishable mineral resource. An insufficiency of water resources can exist only when and where the rate of consumption exceeds the rate of replenishment.

In 1943, the Department of Geology, Mines and Water Resources began a comprehensive inventory of the water resources of the State in cooperation with the United States Geological Survey. Many additional stream-gaging stations were installed to obtain State-wide stream flow coverage with respect to geographic distribution, size of streams, and topographic and geologic features of drainage basins. A State-wide net of observation wells was installed to measure seasonal fluctuations in ground-water levels and trends in ground-water levels

affected by pumpage. Pumping tests have been conducted throughout the State to determine hydrologic properties of aquifers - their transmissibility and their storage. This systematic inventory has been made county by county. It has been completed in the Baltimore industrial area and in the twenty-three counties of the State. The results have been published covering the Baltimore area and twenty-one counties; they are being prepared for printing for the remaining two counties. The cost of these investigations has been in excess of \$2,000,000.

The average annual rainfall in Maryland exceeds 7,000 billion gallons. Nature consumes sixty-percent in evapotranspiration, leaving 2,800 billion gallons to replenish surface waters and ground waters. One-half of this is surface runoff that provides the flood flow of streams. The other half is ground-water recharge which overfills the ground-water reservoirs and spills out of them continuously. It provides the sustained flow of streams between periods of rainfall when there is no surface runoff.

The highest per capita water consumption in Maryland is in Baltimore City. Extrapolated to include the entire State, Maryland would need only 200 billion gallons of water a year. Compilation of available consumption data in 1955 amounted to 40 billion gallons of ground water and 110 billion gallons of surface water a year, a total of 150 billion gallons a year.

Present consumption is only six-percent of the rate of replenishment. The other ninety-four percent is being discharged to waste into the ocean.

Obviously there is no water resources problem in Maryland. Water problems in Maryland can be only water supply problems. Water supply problems arise because nature has not made these over-abundant water resources available everywhere in the quantity needed and at the rate needed at the time needed.

Availability of Maryland's Water Resources

In the Tidewater counties, comprising fifty-four percent of the land area of Maryland, nature has solved these water supply problems with its

ground-water resources, mainly in its artesian aquifers but also in its water table aquifers. All of Tidewater Maryland is underlain by one or more ground-water reservoirs. The storage capacity of these water-bearing sands and gravels is enormous. Their transmissibilities are high. Wells with sustained yields of hundreds of gallons a minute can be developed, unaffected by the most severe and most prolonged droughts imaginable.

Surface water resources play a lesser role and are less widely available in the Tidewater counties. The soil is so porous that surface runoff is less than average. Countless tidal estuaries penetrate far inland. Stream courses above the brackish tidal waters are short and are not numerous.

In Central and Western Maryland, comprising forty-six percent of the land area of the State, the rocks are generally impermeable and water occurs generally only as water table water in small and narrow crevices and openings in the rocks. The transmissibility of these aquifers is low. The average yield of wells is less than 15 gallons a minute. The storage is small and becomes depleted when rainfall is deficient. In dry periods the yields of wells decrease and wells even go dry. Storage, however, is replenished immediately by substantial rainfall, and the yield of wells is restored. Large sustained yields of ground water are not generally obtainable in Central and Western Maryland.

On the other hand, surface runoff and ground-water overflow into streams are greater than average. Stream courses are longer and streams are more numerous. Stream flow is more than sixteen inches per acre in the drainage basins. Large and sustained yields of water are obtainable throughout Central and Western Maryland from surface waters. But only the water in transit in the stream at the time water is needed is automatically available. During periods of low flow, the quantity in transit is inadequate to sustain large yields. Nature has not provided large storage reservoirs to hold its replenishment of surface waters as she has to hold the replenishment of ground waters in the Tidewater counties.

Large sustained yields of surface waters are obtainable, but only by storing the flood waters in reservoirs behind dams.

Status of Users of Water Resources in Maryland

The uses of water resources are: (1) domestic (for the household, family farm animals, poultry, and other livestock, and the family garden and lawn); (2) public water supplies; (3) industrial; (4) supplemental crop irrigation.

Domestic Use

Sustained domestic supplies are available everywhere, and generally more conveniently as ground water. It is both reasonable and practicable to continue their exemption from control. The domestic user has no water resources or water supply problems in Maryland that he cannot solve for himself.

Public Water Supplies

No municipality in Maryland has been unable to find ample water resources. Distribution systems have fallen behind increasing demands resulting from increasing population and increasing per capita consumption, so that use restrictions have had to be placed on consumers at the delivery points of distribution systems that have not kept pace with increasing peak demands. In the Tidewater counties the artesian aquifers, and even the water-table aquifers, have adequate storage for sustained yields, unaffected by periods of deficient rainfall. In Central and Western Maryland, where dependent on surface waters, public water supplies are financially able to provide storage to tide over dry periods of inadequate stream flow.

Public water supplies in Maryland have no water resources problem. To what extent their distribution system is geared to meet expanding peak demands, is merely a supply problem that the taxpayers decide for themselves.

Industrial Use

Water resources are so ample that industries in Maryland have had no problem in locating where an adequate supply can be developed, obtaining adequate sustained yields of ground water in the Tidewater counties without the need to provide artificial storage, or obtaining sustained yields of surface water in Central and Western Maryland by providing storage reservoirs behind dams, insofar as low and drought flows may be inadequate.

Maryland's industrial users have no water resources or water supply problems they have not been able to solve for themselves, or the solutions of which have been impeded by the control to which they have been subjected under the Maryland law since January 1, 1934.

Supplemental Irrigation

Adequate ground-water resources are available throughout Tidewater Maryland for supplemental irrigation. Adequate supplies are obtainable from properly completed wells. The appropriation and use of water for irrigation is now exempt from control. The only irrigation water supply problem is the economic question whether the water is worth the cost of the well required to supply the water.

Amendment of the law to include under its control the use of water for irrigation would not decrease the water resources available for irrigation nor adversely affect obtaining the supply. Control is needed only to protect the irrigator and the people of Maryland against infiltration of brackish tidal water into the aquifers through improperly placed wells and to protect the irrigator's wells against decline in yield through overlapping cones of depression resulting from improperly placed wells.

In Central and Western Maryland large sustained yields of water for irrigation are obtainable from and only obtainable from surface waters. But surface waters are deficient in quantity at the time the yields are needed for

irrigation. Large sustained yields for irrigation require storage reservoirs.

Though the use of surface waters for irrigation is exempt from control under the Maryland policy of the 1933 Act, surface waters are available for irrigation use only to riparian owners. Yet the volume of water in the streams, both as surface runoff and as sustained ground-water overflow, comes equally acre for acre from the total acreage of the drainage basins of each stream. Now the non-riparian owners in a drainage basin contribute proportionally to the stream flow but are deprived of the use of the water for irrigation even though ninety-four percent of the water is discharged to waste into tidal waters.

The irrigators in Central and Western Maryland have two problems:

(1) legal - the non-riparian owners having no rights to the surface waters and the riparian owners having uncertain and undefined limited rights; (2) the economic problem of financing storage. The latter is a heavier financial burden than the wells of the Tidewater irrigators. The solution of the economic problem is merely whether the value of the water for irrigation is worth the cost of storing it. The legal problem is solvable by bringing the use of surface waters under the control provided in the 1933 Act. Many irrigators, both riparian owners and non-riparian owners, have reduced the economic burden and solved the legal problem by collecting and storing surface runoff waters in farm ponds.

The Riparian Rights Fetish

The solution of the legal problem of the irrigators dependent on surface waters has been blocked in Maryland, as well as in other humid states, by adherents to the fetish of riparian rights.

The riparian rights of the individual riparian owners are limited by the riparian rights of all the rest of the riparian owners. The only unchallengeable rights of a riparian owner are unrestricted use for domestic purposes of water left in a stream after all riparian owners upstream have satisfied their unrestricted domestic needs. The downstream riparian owners are "entitled to

have the water flow through their lands undiminished in quantity," except for that which the riparian owners above them are entitled to take for their domestic needs. The riparian owners rights do not include uses of water for industrial or irrigation purposes. These uses are designated "artificial" uses. Because the riparian rights per se permit the use of so little of available stream flow, reasonable withdrawals for artificial needs from the much more that runs to waste are condoned by the courts. But the riparian owner who exceeds his riparian rights by taking water for artificial needs has his permissible uses limited to what is reasonable in relation to the reasonable artificial needs of the other riparian owners. That limitation is subject to all the circumstances surrounding each particular case. It would be more orderly and more satisfactory for the irrigators to have the limitations of their reasonable uses determined in advance under the control provided by the Maryland law than to have the uses challenged and perhaps denied in court afterward.

C. E. Busby, the recognized authority on water law in the United States Department of Agriculture, aptly characterizes the riparian doctrine as a "system ever contracting, never expanding." The fallacy in the riparian rights fetish is that the riparian rights of the individual riparian owner are looked at only under high magnification and the restrictions imposed upon his riparian rights by the riparian rights of the rest of the riparian owners are viewed only under a powerful reducing lens, or even wholly ignored.

Industrial Users Under the Maryland Policy

The industrial users of the waters of the State have been subject to the policy of the control of the appropriation or use of the waters of the State in the interest and welfare of the people of Maryland since January 1, 1934, a period of twenty-six years. Permits have been applied for to take quantities of water ranging from a few hundred gallons of water a day for roadside drive-ins to millions of gallons a day by major industries. No applicant has been denied the

quantity of water applied for. No applicant has failed to obtain the quantity applied for. No applicant has appealed against conditions in the permit issued to him even to the local Circuit Court. No riparian owner has charged violation of his riparian rights in the granting of any permit. The Maryland policy has successfully and satisfactorily proven its merit for twenty-six years in its application to the needs for all users of water subject to its control. If ever "the proof of the pudding is the eating," the Maryland policy has been proven.

Irrigation Users Excluded from the Maryland Policy

Supplemental irrigation has not been practiced and its practice was wholly unforeseen in 1933. The enactment of the Maryland policy was unwittingly so phrased as not to include supplemental irrigation under that policy. The supplemental irrigators are the only users of water for artificial purposes that claim to be in need of a solution of a water problem in Maryland. The Maryland law has inadvertently and unintentionally left them out in the cold.

The water needs of the irrigators lie well within the extremes of the roadside drive-in (greatly exceeding those) and the needs of the large industries (much less than those). Certainly the burden of proof that the Maryland policy is not applicable to water when it is to be used to irrigate is upon those who oppose its application to water used for irrigation. Certainly there is nothing inherent in the policy itself that makes it operable when the water is used in a food-processing plant (industrial use) but makes it inoperable if the water is used instead on the food-growing fields in the vicinity. Certainly it is immaterial to the water resources themselves whether the water they yield is applied to processing food or to growing food. Their opposition is the more unreasonable in that their repeated efforts to find an alternative legal solution have met with repeated failure. They object to control of the water resources of the State in the interest and welfare of the whole people of the

State when used for irrigation under the delusion the policy would impair their riparian rights, even though prohibited in the law. Yet having both unimpaired riparian rights and exemption from control, they labor under the handicap of an unsolved legal problem that the Maryland policy solved twenty-six years ago for the industrial users.

APPENDIX C

REPORT OF THE
BUREAU OF ENVIRONMENTAL HYGIENE
OF THE
DEPARTMENT OF HEALTH

Legislative Authority and Responsibilities

As set forth in the 1957 Annotated Code, Article 43, Sections 387-406, the major water management responsibilities of the State Board of Health are the following: (1) general supervision and control over the waters of the State insofar as their sanitary and physical condition affect the public health or comfort, (2) consult and advise in prevention of water pollution, (3) review and approve plans for public water supply and sewerage or refuse disposal systems, (4) issuance of orders for correction or abatement of pollution, (5) control of industrial pollution, and (6) regulation of subdivision of land.

Present Policies and Programs

For description of various programs now being carried out in the discharge of the Board's legislative responsibilities, see Attachments (4), (5) and (6).

Present and Emerging Problems

Listed below are some of the more pressing current and emerging problems in the water management field confronting the Board of Health:

1. provision of housing, water supply and waste disposal facilities for the rapidly expanding population of the State in such a manner as to insure that water quality standards can be maintained
2. surface and ground water contamination from detergents, insecticides and weedicides
3. devising adequate and appropriate means for disposal of domestic wastes from housing developing on public water supply watershed areas

4. safeguarding quality of water impoundments which may be used for various recreational purposes, as well as the source of raw water for public water supplies

Long-Range Objectives and Program Goals

Long-range objectives and the revision of present and initiation of new policies and programs have not as yet been developed, other than as set forth in Attachments (4), (5) and (6).

Data Collecting, Research and Planning

For listing and description of data collecting activities, see Attachments (5) and (6).

Research is not currently being carried out, nor is such activity contemplated for the future.

Planning operations are described briefly below:

1. active sponsoring of county master planning to meet community water supply and sewerage needs
2. forecasting expected capital costs of community water supply and sewerage facilities
3. promoting joint jurisdictional planning of water supply and sewerage facilities to meet multiple requirements of large metropolitan areas

Attachment 1

WATER, ICE AND SEWERAGE
CHAPTER OF 1957 ANNOTATED CODE,
ARTICLE 43, SECTIONS 387-406

(Not reproduced herein
because of document's
excessive length and
ready availability.)

Attachment 2

REGULATIONS OF STATE BOARD
OF HEALTH GOVERNING INDIVIDUAL
WATER SUPPLY AND SEWAGE
DISPOSAL SYSTEMS FOR HOMES AND
OTHER ESTABLISHMENTS IN THE
COUNTIES OF MARYLAND WHERE PUBLIC
WATER SUPPLY AND SEWERAGE SYSTEMS
ARE NOT AVAILABLE

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Attachment 3

REGULATIONS OF STATE BOARD OF HEALTH
GOVERNING SUBDIVISION OF LAND IN THE
COUNTIES OF MARYLAND

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Attachment 4

Excerpts from Current Biennial
Operational Plan of the Department
of Health

CHAPTER 13 A - SANITARY ENGINEERING

I. SIGNIFICANT HEALTH NEEDS AND ADMINISTRATIVE PROBLEMS

A. Most Important Needs

1. Developing adequate and safe water supplies in incorporated communities not having public water supplies and in the unorganized and unincorporated communities. About twenty-three percent of public water supplies in the State, serving 1.4 percent of the population, are substandard. Over 75 percent of these supplies are chlorinated but the treatment facilities are sometimes poorly operated by local personnel.
2. Promoting sewage treatment plants where untreated or inadequately treated sewage is discharged into water courses supporting shellfish or used for recreation, and to promote the installation of sewers and sewage treatment plants in incorporated and urban communities where none now exist.
3. Promoting suitable methods of refuse collection and disposal for communities, particularly those using open dumps.
4. The sewerage needs in the various counties have been evaluated and the various counties placed in three categories, the first being where sewers are needed, financing ability is limited and progress is slow; the second being where sewers are needed, financing ability is limited and progress has been reasonably good; and the third being where sewers are needed, in general financing ability is good and progress has been reasonably good. Fourteen counties were placed in the first category, seven in the second and the remaining two in the third group. This information, we have been advised by a number of the county health officers and others, has been very helpful to them in their respective areas.

B. Administrative Problems

1. Problems of Finances. Many communities had established no practicable method of financing water supplies and sewage treatment plants. This situation has been improved whereby grants for the construction of sewage works are now available under P. L. 660 of the 84th Congress, and under Chapter 741, Acts of 1957 and 1959, Maryland Legislature. In Addition, the Maryland Legislature passed a State-wide sanitary district law, Chapter 782, under which municipalities in the State may construct water supply and sewerage systems without prior legislative authority.

2. Personnel Shortages. Although salaries have been advanced in recent years, low salaries remain the basic reason for the shortage of personnel. Three positions for sanitary engineers, for instance, are vacant at present.
3. Encouraging Local Health Department Responsibility. The Division of Sanitary Engineering feels that as much responsibility as is practical should be delegated to local sanitarians. As an example, the sanitation of hospitals and nursing homes with less than 30 beds and the routine sampling of public water supplies, has recently been delegated to local health departments. Some of the local health departments are cooperating on the routine inspection and sampling of swimming pools and bathing beaches.

II. PROGRAM CONTENT AND DEVELOPMENT

- A. Control of Public Water Supplies: The Division will continue to review the plans and specifications of new water supplies and of changes to existing public water supplies. It will continue to encourage the building of adequate public water supplies in incorporated communities and in urban areas.

The Division works closely with the Division of Dental Health in encouraging fluoridation where water supplies are carefully operated. The Division gives advice on fluoridation problems, and issues permits for the fluoridation of public water supplies provided all regulations of the State Board of Health are met.

An annual training course for water supply and sewage treatment plant operators is held in cooperation with the University of Maryland, the University of Delaware, the Maryland-Delaware Water and Sewage Association, the Chesapeake Section of the American Water Works Association and the State Departments of Health of Delaware and Maryland.

- B. Control of Sewerage Systems

Although there is adequate legislation to deal with the sewage problem, many communities feel unable to finance the necessary systems. The Division will continue to assist the various communities in securing aid through public funds that are now available.

Local sanitarians will deal with private sewage disposal problems, and will consult with the central office when engineering problems are involved.

- C. Refuse Control

The Division will continue to encourage smaller communities to use the sanitary land-fill method of refuse disposal where soil conditions are suitable. Local health departments and the Division are encouraging suitable refuse collection and disposal facilities for persons not residing in incorporated places and not served by adequate organized refuse collection and disposal services.

D. Control of Subdivision Development

Subdivision problems will continue to be numerous in the next two years. With advisory assistance from the central office, local health departments will continue to enforce the subdivision regulation enacted by the State Board of Health in 1953.

E. Swimming Pool Sanitation

The Division of Sanitary Engineering will continue to review the plans and specifications for all new pools and changes to existing pools. The Division issues construction permits for new pools and annual operating permits. County health departments will play an increasing part in the inspection and sampling program.

F. Public Bathing Places

Local Health departments will handle sanitation problems in connection with public bathing places and will carry out bacteriological sampling and sanitary surveys. The central office, upon recommendation of the county health departments, issues permits for bathing beaches.

G. Problem in Plumbing

Insufficient personnel and absence of adequate local control will result in inadequate coverage of this field in the next two years. Cross-connections will not be completely eliminated until a Statewide cross-connection survey is carried out. The Division of Sanitary Engineering works closely with the Division of Hospital Services in solving the problems at nursing homes and State institutions.

H. Insect and Rodent Control

Local sanitarians have primary responsibility in this program, and obtain technical advice on special problems from the Division. They encourage proper refuse storage, collection and disposal and cooperate closely with the Division of Food Control in eating and drinking establishment sanitation.

I. Hospital and Nursing Home Sanitation

A sanitary engineer from the central office will deal with problems in hospitals and nursing homes with 30 or more beds, and will work closely with the Division of Hospital Service in this field. Local sanitarians will take care of problems in smaller institutions.

J. Private Water Supplies and Sewerage Systems

Local sanitarians will deal with problems in this field, with occasional advice on request from the central office.

K. Public Education in Sanitation Problems

Sanitary engineers and local sanitarians will carry out this phase mainly by personal contact.

III. COOPERATION WITH OTHER PROGRAMS AND AGENCIES

A. Within the State Health Department

1. Bureau of Laboratories will cooperate closely in the chemical and bacteriological examination of samples from public and private water supplies, swimming pools, public bathing places, sewage, streams and industrial wastes. (See Chapter 18)
2. Division of Dental Health will continue the combined program of encouraging fluoridation in those areas where supervision will be adequate. (See Chapter 9)
3. Local Health Service and County Health Departments will deal with most of the local problems in environmental hygiene.
4. Communicable Disease Service will cooperate closely when water or insect borne disease is suspected.
5. Division of Vital Records and Statistics will give frequent assistance with statistical problems.
6. Division of Hospital Services will work closely in the program of hospital and nursing home sanitation.
7. Division of Food Control will help deal with the rodent control problem in eating and drinking establishments.

B. Outside the State Health Department

1. Maryland Water Pollution Control Commission
2. Department of Geology, Mines and Water Resources
3. Interstate Commission on the Potomac River Basin
4. Department of Forests and Parks
5. United States Public Health Service
6. Corps of Engineers, U. S. Army
7. University of Maryland
8. University of Delaware
9. Maryland-Delaware Water and Sewage Association
10. Maryland State Planning Commission
11. Chesapeake Section of the American Water Works Association
12. Game and Inland Fish Commission
13. Public Service Commission

14. U. S. Geological Survey

15. U. S. Department of Health, Education and Welfare

IV. MEASURING PROGRESS OF PROGRAM

1. Number of improvements in public and private water supplies and sewage treatment systems.
2. Percentage of the population served by approved water supply and sewage treatment plants.
3. Number of new approved refuse disposal projects begun during the next two years.
4. Number of older swimming pools converted to recirculating filtration systems and number of new pools built.
5. Number of buildings in which cross connections have been eliminated.
6. Number of public water supplies to which fluoridation will be added during the coming biennium.
7. Percent of the population served by fluoridated water supplies.
8. Number of requests for help in different phases of the sanitary engineering program.

CHAPTER 14 - WATER POLLUTION CONTROL

In order to alleviate the pollution of streams throughout the United States from industrial and sewage waste discharges, the Eighty-fourth Congress, on July 9, 1956, passed Public Law 660, allocating \$50,000,000 per year for each of the next ten years, to be allocated to the States for the elimination or correction of sewage discharge and for research, educational and other allied subjects associated with stream pollution.

Maryland's allocation for the first year for construction purposes was \$756,350 and \$35,000 for personnel, equipment, research, etc. Each of the following years, Maryland is to receive \$750,000 and \$50,000, respectively, for similar purposes. The grant allocations are for specific grant portions of a sewerage system, for which 30 percent of the cost is supplied as an outright grant but not to exceed \$250,000 per project. A stipulation is also made as to what portion of the total may be used for the larger and the smaller units by population ranges.

On June 1, 1957, the 1957 General Assembly of Maryland, under Chapter 741, earmarked \$5,000,000 as the State's contribution to supplement Federal grants. This carried the stipulation that the funds should be equal and matching, but not to exceed 40 percent total of the approvable items. In 1959 the State increased its participation from 40 to 50 percent on the equal and matching basis.

To date, 33 projects have benefited by grant allocations, thus practically consuming all of the funds available through the fiscal year ending June 30, 1960. The total construction cost represented by these projects was \$14,303,984, of which Federal grants amounted to \$2,974,868, and State grants to \$2,558,002.

A publication is being prepared by outside consultants entitled "Community Sewerage Systems." Upon completion, this will be made available to various public officials to acquaint them with some of the highlights of the desirability of sewerage systems, sewage treatment plants, and some of the methods of financing, particularly in the light of the availability of public funds.

A smaller, but indeterminate, amount is needed to purchase equipment to make it possible to carry out a stream sampling program at various locations throughout the State, in order to more accurately evaluate the present degree of pollution and the residual assimilating capacities of various streams.

Attachment 5

MARYLAND STATE DEPARTMENT OF HEALTH
AND
MARYLAND WATER POLLUTION CONTROL COMMISSION

WATER QUALITY SURVEY AND STUDY PROGRAM

1960

WATER QUALITY SURVEY AND STUDY PROGRAM

I. Purpose and Function

The need for a continuing program to determine the quality of the waters of the State has long been recognized by those concerned with the control of pollution of these waters. The need for water quality studies, however, has only been satisfied partially and occasionally, such as by survey activity conducted by the State Health Department and the Water Pollution Control Commission, in connection with a waste discharge. The total program for water quality control in Maryland, to be sound and effective, requires as its base a comprehensive and reliable body of physical, chemical, biochemical, biological, bacteriological, and related scientific data.

The purpose of the proposed program, then, is to obtain such data and make it available to all interested parties, including--but not limited to--the State Health Department, the Department of Tidewater Fisheries, the Game and Inland Fish Commission, the Department of Forests and Parks, the Maryland Port Authority, and the Water Pollution Control Commission.

It is considered the function of this Water Quality Survey and Study Program to conduct the necessary water quality studies needed for an adequate and realistic State water pollution control program. These water quality studies will be developed through sample collection, analysis, interpretation and reporting, and will include information on:

1. the existing conditions and essential characteristics of all waters of the State;
2. the nature and extent of conditions that are not satisfactory;
3. the predominant uses and probable future uses of each stream and body of water and of portions thereof where use is not uniform.

II. Financial Support

This Water Quality Survey and Study Program is considered to be a continuing activity and will require a stable source of funds. To achieve necessary continuity, it is proposed that this activity be established as a State budgeted program, toward which general, special and Federal funds as may be available will be supplied.

III. Organization of Program

A. General Statement

It is agreed that the proposed Water Quality Survey and Study Program be set up within the Water Pollution Control Commission. This contemplates that current resources of the Water Pollution Control Commission must be expanded by the addition of personnel and equipment. A Water Quality Survey and Study Section would be organized within, and under the administrative direction of, the Water Pollution Control Commission.

B. Review

It is proposed that a committee advisory to the Water Pollution Control Commission and the State Health Department be established to be designated "Survey Advisory Committee." This "Survey Advisory Committee" will have as its primary function the review of surveys and studies carried out by the proposed Water Quality Survey and Study Section.

The "Survey Advisory Committee" shall consist of two representatives of the State Health Department, two representatives of the Water Pollution Control Commission and, in addition, shall include a person of recognized competence from outside the two agencies, but acceptable to both agencies, who shall serve as chairman of the Survey Advisory Committee.

C. Field Operation and Laboratory Facilities

It is proposed that personnel and equipment for the new Water Quality Survey and Study Section be organized and equipped so that two survey teams can be maintained at the same time, and if necessary in different areas of the State.

Field operation will require vehicles for transportation, equipment designed for the collection of samples that are representative of conditions as they exist, and laboratory facilities to permit prompt and reliable analyses.

The State Health Department will make available to the Water Pollution Control Commission an existing mobile laboratory to be adapted for the analysis of water, sewage, and industrial wastes.

Where convenient, and facilities can be made available, branch laboratories of the State Health Department will be utilized for bacteriological analyses, and for such other analytical determinations as must be made immediately and can be made readily at such a location. The State Department of Health laboratories will be utilized for all radiological analytical determinations. Otherwise, the Survey and Study Team will require, in proximity to the area being surveyed, adequate space--provided with light, heat, water, and electrical service--which can be equipped and used as temporary field laboratories.

For certain stream surveys, it will be possible to collect samples from bridges, from the shore, by wading the stream, or by use of a car-top boat equipped with an outboard motor. In deeper tidal waters, such sample collection will require the use of the Commission's motor vessel, which for this purpose should be equipped with suitable and convenient sample collection and analysis devices.

Except for bacteriological and radiological analyses and such analyses performed at field laboratory locations, all analytical work will be conducted at the main laboratory of the Water Pollution Control Commission in the Annapolis State Office Building. The Commission's laboratory is now under construction and should be completed early in 1960. Bacteriological analyses will be performed at laboratory locations of the State Health Department.

IV. Two Important Projects

A. A Network of Sampling Stations

One of the primary projects which must be considered by the "Survey Advisory Committee" and developed by the "Water Quality Study and Survey Section" is the establishment of a carefully selected network of sampling stations. Such a network of sampling stations will form the framework to which the long-term activity of the survey and study group can be linked.

B. A Library of Facts

The collection and accumulation of data and water quality information will be one of the most important functions of the new Water Quality Survey and Study Section.

Coincidental with its own beginning, the new group should initiate the setting up of a central library of data reports and other pertinent information on the water characteristics for all areas of the State. Eventually, this library of water quality data for Maryland should represent the most complete and comprehensive storehouse of such information, including not only data collected by the survey group, but also such other reliable data as obtained by other agencies, by industries, or by others, and should be available for consultation by all interested parties.

V. Organizational Plan

The organization, staffing, direction, personnel administration and fiscal management of the Water Quality Survey and Study Section will be the responsibility of the Water Pollution Control Commission. It has been agreed, however, that the chief of the Study Section staff shall be an individual appropriately qualified and suitable in education and experience to the State Department of Health as well as the Water Pollution Control Commission.

A plan for staffing, equipping and financing the Study Section is attached as Appendix A.

VI. Interagency Commitment

The aforesated operating program for continuous water quality appraisal of "the waters of the State" has been jointly planned and subscribed to by the Director of the Water Pollution Control Commission and the Chief of the Bureau of Environmental Hygiene of the State Department of Health. The following stipulations, approved by the undersigned, will govern operations of the program and the spirit and performance of the involved staff of both agencies:

1. The program operation will be budgeted and placed within the Water Pollution Control Commission which will be responsible for housing and administering personnel, equipment, etc.
2. The general program organization as herein set forth and after approval by the undersigned shall be carried out by the Water

Pollution Control Commission. Responsibility for routine administration and execution shall be that of the Water Pollution Control Commission.

3. Determinations as to planning, field operations and analytical methodology shall be jointly made by both agencies. Specific survey and study operations and activities shall be planned on a semi-annual basis and reviewed on at least a quarterly basis by designated staff members of both agencies. These operations and activities shall be planned and executed on a basis which will benefit equally the needs of both agencies.

Temporary or emergency variation of program activity may be instituted by agreement of the Director of the Water Pollution Control Commission and the Chief of the Bureau of Environmental Hygiene, State Department of Health.

4. Operating staff of both agencies shall have access to all current study data at any stage of completion as such data may be desired for operational guidance.
5. All data shall be considered public information upon completion of the survey and study which developed that data. Prior to any release, written reports will be reviewed and approved by the "Survey Advisory Committee."
6. Annual reports of program operations shall be prepared by the survey staff and submitted to the undersigned as soon as possible after July 1 of each year.
7. An annual review and evaluation of the entire program shall be prepared by the "Survey Advisory Committee" and submitted to both agencies.

Reviewed and approved by the
Water Pollution Control Commission
at its meeting on December 14, 1959

By //S// Maurice Siegel
Chairman

Reviewed and approved by the
State Board of Health at its meeting on February 19, 1960

By //S// Perry Prather
Chairman

Reviewed and approved in principle
as to interagency operation on
March 21, 1960

By //S// J. Millard Tawes
Governor

Attachment 6

MARYLAND STATE DEPARTMENT OF HEALTH
Bureau of Environmental Hygiene

THE PEACH BOTTOM ATOMIC POWER STATION (PBAPS)
Pre-Operational Environmental Survey Plan

By

Arthur E. Johnston, Bureau of Laboratories
John M. Brown, Division of Occupational Health

Introduction

A major commercial atomic power station is planned for construction in South central Pennsylvania near Peach Bottom on the Susquehanna River. The reactor is expected to go into operation in early 1963. In order to determine the effect of reactor effluents on the environment, this plan is proposed to measure the levels of radioactivity prior to criticality, for purpose of establishing base line information. Samples of a number of carefully selected environmental media will be collected within a radius of 30 miles of the proposed site at a rate of 60 to 80 per month. All samples will be analyzed for gross activity and monthly or quarterly composites will be analyzed for one or more specific radioisotopes. The methods of reporting data and the distribution channels are being developed. It is suggested that annual compilations of these data be distributed to the interested agencies and that an exchange of data be solicited from Pennsylvania State Health Department and the Philadelphia Electric Company.

Sample Collection

The location of sampling points are shown on the map in Fig. I. Population distribution local meteorology and the configuration of the Susquehanna River have been considered in selection of sampling locations.

Surface Water

One surface water sample per week is to be collected at each of sites shown on figure I. The sample will consist of 2 liters collected by immersing the container in the water to be sampled. Composite samples will be taken at Conowingo Dam with the cooperation of the National Water Quality Network station operator. Similar cooperation will be given by the station operator at Port Deposit and Havre de Grace.

Underground Water

Wells have been selected that will provide samples from various aquifers of interest in the area as shown on figure I. These will be collected monthly in 2 liter polyethylene jugs.

Precipitation

Samples will be collected continuously and analyses will be made when a sufficient volume has been composited. The sampling will be done at the Air Sampling Station located at State Police Barracks F, Rising Sun and Whiteford. The Westminster Station will provide a blank sample.

Dust

Air borne particulate will be collected at weekly intervals at each of the three stations indicated on figure I. An additional sample will be collected at Westminster to serve as a blank. These samples will be taken with a Staplex sampler at the rate of 30 CFM. The sampler will operate at intervals as directed by a time clock, and the filters will be collected weekly. The filter used will be glass fiber 7 X 9 inches.

Biota

Various biological media have been selected with a view to detecting biological concentration of radioactive materials and to observe any significant quantities of these materials in the human food chain.

Terrestrial Samples

Samples will be collected once monthly at four farms in the area as indicated on figure I. Various Plants such as alfalfa, Queen Anne's lace, and spinach, if available, will be collected at these points during the growing season. Special samples may be taken, if desired, during harvesting of food crops. Apples may be collected from a large orchard in the area immediately south of the reactor site. Animal bone and thyroid may be taken if available.

Aquatic Samples

Aquatic biota will be collected six times a year at each of the locations marked on figure I.

Sedimentary material will be collected with an Eckman dredge at suitable points to be later selected. These samples will be hand picked to remove benthic organisms, which will be treated as a separate sample when the quantity is sufficient.

Higher aquatic plants, juvenile fish and plankton, will be collected in nets handled from a small boat. Larger fish will be collected in traps if these devices can be utilized in water of this depth.

Radiochemical Procedures

A suitable carrier for the element to be isolated is added to the sample which is then reduced to a manageable volume by evaporation. The reduced sample is passed through a millipore filter to remove the insoluble material. The filter is dried, counted and stored.

Barium and Strontium are precipitated first as carbonates. Calcium is then removed by successive treatment with fuming nitric acid. Cations other than Ba and Sr are scavenged by ferric hydroxide and filtered off. Barium is precipitated as the chromate, filtered, dried, weighed and counted. Strontium is precipitated as the oxylate, filtered, dried, weighed and counted.

Cesium

Cesium is precipitated by Silico-tungstic acid in an aliquot containing a Cesium carrier. The cesium is filtered, dried, weighed and counted.

Iodine is converted to free iodine with chlorine water and is extracted with CCl_4 . Free iodine is removed from the CCl_4 with an aqueous solution of sodium bisulfite and is precipitated as silver iodide. The precipitate is filtered, dried and counted.

Potassium is precipitated with Sodium Tetraphenyl boron, filtered, dried, weighed and counted.

Biological Samples

Biological samples will be ashed either wet or dry, depending on whether iodine is to be determined, in which case an aliquot for iodine could be treated separately. When all organic matter is removed, the sample will be treated in the manner described above.

Milk

Protein will be precipitated with trichloroacetic acid and the residue counted in a well counter for iodine. The filtrate will be neutralized and Ca, Sr and Ba precipitated as Carbonates and treated as outlined above. The filtrate after removal of Alkaline metal will contain Cesium and Potassium and will be separated as outlined previously.

Operating Cost - Per Year

The experience of the National Sanitation Foundation preoperational survey for the Fermi reactor indicates that the following cost distribution is valid.

<u>Item</u>	<u>Percent</u>	<u>Cost</u>
Consumable Material	25	\$ 5,260
Travel to collect samples	5	1,052
Labor	70	14,731
Sample Collection	10	
Sample Analyses	25	
Data Handling	20	
Supervision	15	
	<hr/> 100%	<hr/> \$21,043

This estimate is based on the assumption that only a maximum of time be spent by laboratory personnel in collecting samples.

Equipment and Personnel

The following is a list of material and equipment necessary to conduct a survey of this type.

Laboratory Personnel

Chemist III - industrial	\$4547	-	\$5450
Laboratory Assistant	2740	-	3290
Laboratory Assistant (Summer Student)	930	-	

Cost beginning year\$8210.00

Sampling Equipment - Water and Aquatic Biota

1 ea. Boat, Aluminum Utility - 16'	\$ 450.00
1 ea. Motor, Outboard, Johnson, 18 hp. (used)	350.00
1 ea. Eckmann Dredge and cable	300.00

Sampling Equipment (cont'd.)

3 ea. Galvanized tubs - 15 gal. for silt	\$ 23.00
24 ea. Freezer Containers - Nalgene, 1 qt. cap.	10.00
24 ea. Bottles, narrow mouth, Polyethylene, 32 oz.	21.00
1 ea. Hoist for Eckmann dredge	75.00
Miscellaneous Nets	100.00
6 ea. D-traps, Game and Inland Fish design	60.00
1 ea. Station wagon, Willy's Jeep w/4 wheel drive	3100.00

Air Sampling

3 Hivol Air Samplers	@ \$138.00	\$ 414.00
3 Flow Controllers, Hivol	" 30.00	90.00
3 Shelters, Equipment, Air Station	" 450.00	1350.00
3 Velocity & Direction Wind Recorders	" 2000.00	6000.00
3 Hygrothermographs, Recording	" 250.00	750.00
3 Time Controllers	" 40.00	120.00
3 Baroscribes	" 135.00	405.00
3 Shelters, Instrument, weather and stand	" 85.00	255.00
4 Precipitation collection devices	" 30.00	120.00
3 Dustfall collection devices	" 7.00	21.00
3 RAC dust samplers	" 200.00	600.00
Yearly requirement, tapes, filters, record charts, ink, etc.		300.00
Maintenance supplies		60.00

Laboratory Equipment

The cost of this equipment has been submitted in the 1962 fiscal budget.

Bureau of Laboratories

6 ea. Vicor dishes, 350 ml.	\$ 42.17
6 ea. Vicor dishes, 1000 ml.	49.64
1 ea. Furnace, Muffle Electric Temco, Fisher 10-557	250.00
1 Controller and Pyrometer, Temcometer, type D-230V, 6900 W, 30 amp.	82.50
6 ea. Crucible, Nickel, w/o cover, 250 ml., Fisher 8-020,	@ \$ 5.00
2 ea. Hydrosol Stainless, filter holder	150.00
Millipore Filter Co. (No. - XX 20-097-20)	
Bedford, Mass.	
1 ea. Automatic System for low level counting- Nuclear Chicago Corporation	
223 West Erie Street	
Chicago 10, Illinois	
consisting of - -	
1 ea. Model 192A Ultra Scaler	1695.00
1 ea. Model 1820 Recording Spectrometer (includes 1620B Ratemeter)	2450.00
1810 Radiation Analyzer, R-2000 - 10 NU Recorder and control panel	
1 ea. D-47 Window, gasflow counter, for use in the proportional or geiger region, window is 150 micro gms/cm ²	395.00

Bureau of Laboratories (cont'd.)

1 ea. D-47 Preamplifier		\$ 125.00
1 ea. GP-100 PR gas and cylinder		75.00
1 ea. K-3 Gas Regulator		40.00
1 ea. DS - S - 3 C 2" x 2" N A I, Thallium, activated, w/switch for scaler or analyser use		785.00
1 ea. C-110B Automatic sample changer		1425.00
1 ea. C-111B Printing Timer (print out)		770.00
1 ea. 3052 Lead Shield		165.00
1 ea. DS-5-5 Scintillation well counter for liquid samples		1035.00
1 ea. SK-1 Standards and Sources Kit includes 16 low-level sources		395.00
4 ea. Hot plate, Temco Fisher 11-494	@ \$ 19.75	78.00
1 ea. Anti-coincidence Counting Assembly		2250.00
1 ea. Stirring Apparatus, Waring Blendor Fisher 14-509-10		34.95
2 ea. Jars for Waring Blendor, Fisher 14-509-11	@	3.00 6.00
2 ea. Cover, Waring Blendor Jars	"	.65 1.30
2 ea. Blending Blade Assembly, Fisher 14-509-12"	3.50	7.00
3 ea. Bottles, dispensing, 5 gal., w/12" Poly- ethylene spigot	" 23.20	<u>69.60</u>
Total, Equipment only		\$27,430.16

APPENDIX D

REPORT OF THE WATER
POLLUTION CONTROL COMMISSION

Legislative Authority and Responsibilities

Legislative authority is found in Acts of 1947 codified as Sections 34-45 inclusive, Article 66C, Annotated Code of Maryland (1957 Edition). A copy of the act and regulations promulgated are attached. Also attached is a copy of a letter dated October 16, 1956, signed by Mr. Alexander Harvey III, Assistant Attorney General, which states responsibility of the Water Pollution Control Commission.

The major responsibilities as prescribed by law are to study, investigate and recommend ways and means of eliminating all substances which pollute or tend to pollute waters of the State and to recommend methods for preventing pollution as well as the enforcement of existing laws relating to the abatement of pollution of the waters of the State.

Present Policies and Programs

(For statement of policy, please refer to attached material.)

Engineering Program

The engineering staff working in specifically assigned districts is responsible for the enforcement of the Water Pollution Control Law and Regulations within that district. These engineers make routine inspections of all industrial waste sources and discharges taking samples where necessary, contact the responsible persons involved and obtain compliance with the Water Pollution Control Commission's Regulations.

Laboratory Program

The Laboratory is responsible for the immediate and accurate analysis of all water and waste samples through chemical, physical, or biological or

other techniques available to supply the engineering staff with the necessary data and information.

Survey and Study Program

This is a new program to be activated in July, 1960 to obtain basic data and water quality information on all waters of the State for use by the State Health Department and the Water Pollution Control Commission.

Present and Emerging Problems and Needs

The present and emerging problems confronting the Commission and related needs are listed below:

1. development and promotion of adequate and economically feasible method for the control and prevention of acid mine drainage
2. development and promotion of adequate methods for the surveillance and apprehension of ships discharging oil into tidal waters
3. development and control required for increasing quantities of high quality and clean waters to satisfy domestic and industrial requirements and for aquatic and wildlife and recreational purposes
4. development and promotion of suitable, yet inexpensive methods of treatment and disposal of organic waste waters from small seasonal industries and small boats and yachts
5. development and promotion of methods to overcome present financial problems of the smaller communities where economical methods of financing community projects are now lacking
6. development and promotion of additional methods to further reduce and control soil erosion of streams of the State
7. development and expansion of public educational methods in matters of water pollution control
8. development and promotion of better cooperation and mutual exchange of information regarding control programs by the multiplicity of agencies with a responsibility in and jurisdiction over some phase of water pollution
9. development and promotion of State-wide stream and tidal water investigations to provide more complete data on sources and effects of water pollution, stream and tidal water quality and desirable water uses

10. acceleration of current industrial and municipal water pollution abatement progress

(Since considerable industrial waste pollution abatement hinges upon the completion of municipal facilities, incomplete data and interrelation of the problems involved makes it difficult to determine the relative status of municipal and industrial waste pollution abatement.)

Long-Range Objectives and Program Goals

Listed below are the Commission's long-range objectives and program goals:

1. maintain and preserve good water quality wherever it now exists
2. determine and establish water usage of the greatest benefit to all the people and water quality standards most appropriate for each use
3. improve poor water quality wherever it exists through techniques and procedures most effective in meeting the standards of water quality as based on use
4. collect and keep up-to-date data concerning water quality throughout the State

Data Collecting and Research

The Water Quality Survey and Study Program is a new activity within the Water Pollution Control Commission organization and is expected to be in operation early in 1961 fiscal year. This program will obtain water quality data and information on all the waters of the State for use by the State Health Department and the Water Pollution Control Commission.

No research is carried on conducted by the Water Pollution Control Commission. However, the Chesapeake Bay Institute of the Johns Hopkins University is conducting a study of the Baltimore Harbor Area under contract with the Department of Research and Education, supported by funds from industry, the State Health Department and the Water Pollution Control Commission.

Attachment 1

STATE OF MARYLAND
WATER POLLUTION CONTROL LAW
1959

Published by Water Pollution
Control Commission

(Not reproduced herein
because of document's
excessive length and
ready availability.)

Attachment 2LETTER OF ASSISTANT
ATTORNEY GENERAL

October 16, 1956

Mr. Robert M. Brown, Chief
Bureau of Environmental Hygiene
State Department of Health
2411 N. Charles Street
Baltimore 18, Maryland

Dear Mr. Brown:

You have recently requested our advice concerning the responsibility of the State Board of Health to join with the Water Pollution Control Commission in administering a State water pollution control program under Public Law 660 (84th Congress), which amended the Federal Water Pollution Control Act (33 U.S.C.A. 466-466(j)). Section 5 (a) of this enactment provides for an appropriation for the fiscal year ending June 30, 1957, and for succeeding fiscal years for grants to states "to assist them in meeting the cost of establishing and maintaining adequate measures for the prevention and control of water pollution." Section 6 (a) authorizes grants to a state "for the construction of necessary treatment works to prevent the discharge of untreated or inadequately treated sewage or other waste into any waters, and for the purpose of reports, plans and specifications in connection therewith."

By letter dated August 28, 1956, to the Acting Secretary of the Department of Health, Education and Welfare, the Governor designated the Water Pollution Control Commission as the official State agency authorized to carry out the provisions of Public Law 660. You state that although there is little doubt that the Commission is the proper agency to administer grants to States under Section 5 (a), the Board of Health has traditionally been the State agency primarily responsible for preventing water pollution arising as a result of improper sewage treatment, and you inquire as to the Board's part in administering funds available under aforesaid Section 6 (a).

Prior to 1947, the State Board of Health had sole responsibility for programs designed to prevent water pollution affecting the health of the people of this State, whether such pollution resulted from the discharge of industrial waste or from untreated or inadequately treated sewage. However, by Chapter 697 of the Acts of 1947 (codified as Sections 34-45 of Article 66C of the Code), the Legislature created the Water Pollution Control Commission with wide powers to prevent pollution in the waters of the State. Section 34 defines "pollution" as -

"the discharge or deposit into any of the waters of the State of any liquid or solid substance or substances which may create a nuisance therein or render such waters unclean or noxious so as to be detrimental to the propagation, cultivation or conservation of animals, fish or aquatic life, or unsuitable with reasonable treatment, for use as present or possible future source of public water supply or unsuitable for commercial, industrial, agricultural, recreational or other reasonable uses. * * *".

Mr. Robert M. Brown

- 2 -

October 16, 1956

Section 43 provides that nothing in the Water Pollution Control Law should be construed "to alter, change, modify or restrict the jurisdiction of the State Board of Health of Maryland as set forth in Article 43 and the amendments thereto of the Annotated Code of Public General Laws of Maryland."

Section 366 of Article 43 defines the powers of the State Board of Health, with respect to the supervision and control over the waters of the State, as follows:

"The State Board of Health shall have general supervision and control over the waters of the State, in so far as their sanitary and physical condition affect the public health or comfort; and it may make and enforce rules and regulations, and order works to be executed, to correct and prevent their pollution. It shall investigate all sources of water and ice supply, and all points of sewage discharge. It shall examine all existing public water supplies, sewerage systems and refuse disposal plants, and shall have power to compel their operation in a manner which shall protect the public health and comfort, or to order their alteration, extension or replacement by other structures when deemed necessary. After April 16, 1914, it shall pass upon the design and construction of all public water supplies, sewerage systems and refuse disposal plants which shall be built within the State."

It is clear that the responsibility of the State Board of Health relates solely to water pollution conditions which adversely affect the public health or comfort, and does not extend to conditions detrimental to the propagation, cultivation or conservation of animals, fish or aquatic life. On the other hand, even though the water pollution control law, when codified, was placed in Article 66C relating to natural resources generally, it is equally clear from Section 34 of Article 66C that the Commission's jurisdiction likewise extends to water pollution conditions affecting the health or comfort of the public. It is in this latter area that there is an overlapping jurisdiction with respect to which both the State Board of Health and the Water Pollution Control Commission may, under existing law, exercise control. Had the Legislature not included Section 43 of Article 66C in Chapter 697 of the Acts of 1947, it might well have been said that the intention was to remove from the jurisdiction of the State Board of Health all the water pollution control functions that it had traditionally exercised and to transfer same to the newly created Water Pollution Control Commission. However, the above Section clearly indicates a legislative intention that the two State agencies should have coordinate responsibility in areas where the public health and comfort are affected by water pollution.

At the conference recently held in this office, at which you and Mr. Paul W. McKee, Director of the Water Pollution Control Commission, were present, you stated that the two agencies had some time ago agreed upon a manner of operation in this area of overlapping jurisdiction. We understand that it was decided that the Water Pollution Control Commission would have primary responsibility with respect to water pollution resulting from the discharge of industrial waste, and that the State Board of Health would have primary responsibility with respect to water pollution resulting from untreated

Mr. Robert M. Brown

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October 16, 1956

or inadequately treated sewage. You and Mr. McKee further stated that although this practice has not been the subject of express legislation, the budgets of each agency have consistently reflected the fact that personnel of the State Health Department have concerned themselves primarily with sewage pollution, while personnel of the Water Pollution Control Commission have been concerned with problems of industrial waste pollution. Each year these budgets have been approved by the Legislature, thus giving legislative sanction to this administrative practice.

In view of the statutory provisions providing for overlapping jurisdiction of the two agencies in certain areas, and in view of the long-standing administrative practice referred to hereinabove, it is our opinion that both the Water Pollution Control Commission and the State Board of Health are the official agencies of the State of Maryland authorized to carry out the provisions of Public Law 660. In other words, the over-all program contemplated by Federal authorities will be undertaken in the State of Maryland as a joint effort on the part of these two agencies. In particular, it would appear that the Water Pollution Control Commission is the proper agency under Section 5 (a) of Public Law 660 to receive and administer the grants provided for thereunder, in view of the fact that such grants are to be used for establishing and maintaining adequate measures for the prevention and control of water pollution in general. Similarly, the State Board of Health would appear to be the proper agency to receive and administer grants under Section 6 (a), since such grants are for the construction of necessary treatment works to prevent the discharge of untreated or inadequately treated sewage into waters of the State. In both instances, however, your two agencies will, of course, continue to cooperate with each other to further this joint program.

We are sending two extra copies of this letter to the Governor so that he may transmit one copy to the Acting Secretary of the Department of Health, Education and Welfare. The latter should be advised that the State Board of Health has, under Maryland law, concurrent responsibility with the Water Pollution Control Commission for enforcing State laws relating to the abatement of water pollution.

Very truly yours,

Alexander Harvey, II,
Assistant Attorney General

AH-h

Attachment 3

WATER POLLUTION CONTROL COMMISSION
POLICY AND PROGRAM FOR THE CONTROL OF WATER POLLUTION

Legal Authority

Definition of Pollution

"The discharge or deposit into any of the waters of the State of any liquid, gaseous or solid substance, or substances which may create a nuisance therein or render such waters unclean or noxious so as to be detrimental to the propagation, cultivation or conservation of animals, fish or aquatic life, or unsuitable with reasonable treatment for use as present or possible future sources of public water supply or unsuitable for commercial, industrial, agricultural, recreational or other reasonable use." Article 66C, Section 34.^{1/}

Jurisdiction of Commission

All waters of the State, both surface and underground, including the Chesapeake Bay and its tributaries and the "Atlantic Ocean and its tributaries within the State of Maryland." Article 66C, Section 34.

Policies

The policy and activities of the Water Pollution Control Commission of the State of Maryland must obviously be a logical consequence of the terms of the Water Pollution Control Law, as stated in Article 66C, Annotated Code of the Public General Laws of Maryland, 1951 edition, Sections 34-45.

The provisions of this law assign to the Water Pollution Control

^{1/} The authority of the Commission over sanitary sewage is limited by Article 66C, Section 43 which states that "nothing in this sub-title shall be construed to alter, change, modify or restrict the jurisdiction of the State Board of Health" as set forth in Article 43 which gives the State Board of Health the jurisdiction over pollution which may affect human health.

Commission, within the limits of the enabling act, specific functions, duties, and authority, as follows:

- A. It shall be the duty of the Commission to study, investigate and from time to time recommend ways and means of eliminating from the waters of the State, so far as practicable, all substances and materials which pollute or tend to pollute the same and to recommend methods, as far as practicable, for preventing pollution as defined...
- B. The Commission is authorized, within the limits of the enabling act:
 1. to encourage voluntary cooperation by the citizens of the State and by the industries, municipalities, counties, metropolitan districts, and the State in restoring, preserving and maintaining the purities of the waters of the State for the greatest benefit of all the people of the State.
 2. to enforce existing laws relating to the abatement of pollution of the waters of the State
 3. to supplement and expand existing technical or other water pollution data by study, investigation, research or other means that may be available, and to cooperate with, assist and aid other State agencies engaged in assembling, accumulating or developing additional data or information on water pollution
 4. to cooperate with, assist and aid other State agencies in enforcing water pollution laws or regulations
 5. to cooperate with the responsible authorities of other States and the Federal Government or any agencies thereof concerning policies, procedures and means to be employed to control, regulate or correct the pollution of any inter-state waters and to recommend carrying out such procedures to the proper State agencies
 6. to recommend standards for waste effluents discharged into the waters of the State
 7. to receive complaints or petitions relating to pollution or alleged pollution of the waters of the State and to investigate and take such action as hereinafter provided
 8. to conduct hearings, upon due notice, as may be advisable or necessary for the discharge of duties...

9. to issue a special order or orders directing any person in this State causing the pollution of State waters to secure within the time specified therein, such operating results as are practical of attainment toward the reduction, control, abatement, and prevention of such pollution. If such results are not secured within the specified time, the Commission shall further direct such person to build or install and use within a reasonable specified time such designated system, treatment plant structures, devices or means as are practicable and available for controlling, abating and preventing such pollution and to modify, amend or cancel any such special order or orders
10. to publish its findings and to make recommendations to the appropriate State agencies relative to public policy and procedure necessary to correct water pollution conditions or violations of any of the laws of Maryland relating thereto
11. to establish such reasonable water quality standards or criteria for any of the waters of the State, keeping in mind the public use to which they are or may be put, as may be deemed necessary
12. to receive, administer, and expend such funds as are now or may become available for pollution control from the Federal Government or any agency thereof
13. and to recommend from time to time such legislative or administrative action as may be deemed necessary and desirable better to control the pollution of the waters of the State
14. the Commission shall have the authority to, and shall enforce the provision of this sub-title and shall make and promulgate such rules and regulations and conduct such investigations as shall from time to time be deemed necessary to carry out the provisions of this sub-title.

Implementation of Policies (Programs)

Collection of Information

1. reliable data and information showing the condition of waste discharges and of receiving waters
2. reliable data and information showing the effects of such discharges in the waters of the State
3. best prevailing usage and anticipated future use of the waters of the State
4. evaluation of data and information by reference to the appropriate Commission regulations
5. administrative judgment to determine necessary corrective action

6. resolute efforts to obtain voluntary compliance and cooperation and
7. resort to the sterner measures of law, where this becomes necessary.

Utilization of Information

1. establish for its own guidance, but not by regulation for uniform application, criteria of minimum water qualities required for designated existing and probable future uses
2. establish for its own guidance, but not by regulation for uniform application, standards of water quality considered desirable or necessary of attainment for the existing and probable future uses of the waters of the State
3. establish by regulation to be uniformly applied to all State waters, criteria which will insure a condition of cleanliness above the nuisance level--how far above it to be determined after a thorough understanding of the purpose to be served--and which will conform to basic State plans and policies as implemented by the various cognizant agencies, so that standards established and enforced in various areas will not be in conflict therewith.

Implementation of Policy

1. by communication to the general public through all possible means
2. by communication to persons and groups which will be affected, by means of written statements, addresses at meetings and individual personal contacts.
3. by efforts to obtain voluntary compliance, as specified in the law
4. upon failure of such efforts, by compulsory Commission orders and judicial decrees.

March, 1960.

Paul W. McKee

Attachment 4

POLICY AND PROGRAM
FOR THE CONTROL OF
WATER POLLUTION

As revised according to recommendations made
at Commission meeting on January 25, 1956

State of Maryland
Water Pollution Control Commission

January, 1956

Statement of General Policy

It is declared to be the policy of the State of Maryland to protect the waters of the State from despoilment by pollution, to require correction and improvement of all contaminated waters, and to maintain in these waters standards of purity consistent with the public use and public enjoyment thereof.

To this end, the Water Pollution Control Commission of the State of Maryland shall control by the reasonable enforcement of adequate regulations the discharge or deposit of substances, other than sanitary sewage,^{1/} which may

1. create a nuisance in the waters of the State,^{2/}
2. or render these waters detrimental to the propagation, cultivation or conservation of animals, fish or aquatic life,^{2/}
3. or adversely affect these waters for use as possible source of public water supply,^{2/}
4. or make these waters unsuitable for commercial, industrial, agricultural, recreational or other reasonable uses.^{2/}

In addition, the Water Pollution Control Commission shall foster a program of active assistance and mutual cooperation with the efforts of State, county, and municipal health authorities to control water pollution in the interest of the public health.

To achieve these aims, this Commission shall require the utilization of all available knowledge and every reasonable means to effect the necessary control and treatment of any discharge or deposit, other than sanitary sewage, which causes or may cause pollution in the waters of the State.

^{1/} The authority of the Commission over sanitary sewage is limited by Section 43, which states: "Nothing in this sub-title shall be construed to alter, change, modify or restrict the jurisdiction of the State Board of Health of Maryland as set forth in Article 43 and the amendments thereto of the Annotated Code of Public General Laws of Maryland."

^{2/} Article 66C, Section 34, from the definition of "Pollution"

Introductory Remarks

In January, 1949, the Maryland Water Pollution Control Commission first made known its approach to the control and abatement of water pollution in a publication entitled: "Water Pollution: A Policy and Program for Control."

In the seven years since that time, the many changes that have occurred now prompt a revision of the 1949 Statement of Policy. Since 1949, the Water Pollution Control Law has been amended, one regulation has been withdrawn, another has been extensively revised, and two new regulations have been formulated. During this time, the efforts of this Commission have achieved a significant diminishing of the pollution of Maryland waters and an active control program has endowed us with much worthwhile experience and a better understanding of the pollution problems still facing us.

This publication, then, will set forth an up-to-date statement of policy and a realistic program for the control and abatement of water pollution in Maryland.

Significant Passages in the Law

The policy and activities of the Water Pollution Control Commission of the State of Maryland must obviously be a logical consequence of the terms of the Water Pollution Control Law, as stated in Article 66C, Annotated Code of the Public General Laws of Maryland, 1951 edition, sections 34-45.

The provisions of this law assign to the Water Pollution Control Commission, within the limits of the enabling act^{1/}, specific functions, duties, and authority, as follows:

- A. It shall be the duty of the Commission study, investigate and from time to time recommend ways and means of eliminating from the waters of the State, so far as practicable, all substances and materials which pollute or tend to pollute the same and to recommend methods, as far as practicable, for preventing pollution as defined...
- B. The Commission is authorized, within the limits of the enabling act:^{1/}
 1. to encourage voluntary cooperation by the citizens of the State and by the industries, municipalities, counties, metropolitan districts, and the State in restoring, preserving and maintaining the purities of the waters of the State for the greatest benefit of all the people of the State
 2. to enforce existing laws relating to the abatement of pollution of the waters of the State
 3. to supplement and expand existing technical or other water pollution data by study, investigation, research or other means that may be available, and to cooperate with, assist and aid other State agencies engaged in assembling, accumulating or developing additional data or information on water pollution
 4. to cooperate with, assist and aid other State agencies in enforcing water pollution laws or regulations

^{1/} The authority of the Commission over discharges affecting the public health is limited by Section 43, which states: "Nothing in this sub-title shall be construed to alter, change, modify or restrict the jurisdiction of the State Board of Health of Maryland as set forth in Article 43 and the amendments thereto of the Annotated Code of Public General Laws of Maryland."

5. to cooperate with the responsible authorities of other States and the Federal Government or any agencies thereof concerning policies, procedures and means to be employed to control, regulate or correct the pollution of any interstate waters and to recommend carrying out such procedures to the proper State agencies
6. to recommend standards for waste effluents discharged into the waters of the State
7. to receive complaints or petitions relating to pollution or alleged pollution of the waters of the State and to investigate and take such action as hereinafter provided
8. to conduct hearings, upon due notice, as may be advisable or necessary for the discharge of duties
9. to issue a special order or orders directing any person in this State causing the pollution of State waters to secure within the time specified therein, such operating results as are practical of attainment toward the reduction, control, abatement, and prevention of such pollution.

If such results are not secured within the specified time, the Commission shall further direct such person to build or install and use within a reasonable specified time such designated system, treatment plant structures, devices or means as are practicable and available for controlling, abating and preventing such pollution and to modify, amend or cancel any such special order or orders
10. to publish its findings and to make recommendations to the appropriate State agencies relative to public policy and procedure necessary to correct water pollution conditions or violations of any of the laws of Maryland relating thereto
11. to establish such reasonable water quality standards or criteria for any of the waters of the State, keeping in mind the public use to which they are or may be put, as may be deemed necessary
12. to receive, administer, and expend such funds as are now or may become available for pollution control from the Federal Government or any agency thereof
13. and to recommend from time to time such legislative or administrative action as may be deemed necessary and desirable better to control the pollution of the waters of the State.

The authority of the Water Pollution Control Commission is finally summed up in the Water Pollution Control Law as follows:

The Commission shall have control of the pollution of all waters of the State of Maryland, except as herein-after provided^{1/}, which are or may be affected by waste disposal of municipalities, industries, public or private corporations, individuals, partnerships, associations or any other entity.

The Commission shall have the authority to, and shall enforce the provision of this sub-title and shall make and promulgate such rules and regulations and conduct such investigations as shall from time to time be deemed necessary to carry out the provisions of this sub-title.

* * * *

In the foregoing section the detailed portions of the Water Pollution Control Law establish a purposeful course of action for this Commission, and, therefore, may be said to constitute an inherent policy for the control of water pollution.

A Policy According to the Law

The provisions of the Water Pollution Control Law previously enumerated, require that this Commission act to protect the waters of the State from despoilment by pollution, to obtain correction and improvement of all contaminated waters, and to maintain in the waters of the State standards of purity consistent with public use and public enjoyment. In accordance with the law, it is the policy of the Commission to establish a program for control which not only affects the elimination of objectionable conditions, but also provides maximum benefit for the citizens of the State and conforms to the prevailing pattern of the best usage of State waters. To the extent that this pattern changes with the passage of time, as new areas of the State are developed for industrial uses and other areas are recovered for recreational purposes, the overall program of control must change. Therefore, the Commission's program must never become a

^{1/} The authority of the Commission over discharges affecting the public health is limited by Section 43, which states: "Nothing in this sub-title shall be construed to alter, change, modify or restrict the jurisdiction of the State Board of Health of Maryland as set forth in Article 43 and the amendments thereto of the Annotated Code of Public General Laws of Maryland."

fixed, static entity, but instead must always be a vital, dynamic course of action adaptable to the changing needs of the occasion and of time.

This Commission must perform its function for all of the people: for the fisherman; for the conservationist; for the person who looks to the water for economic benefit or recreational pursuit; for the industrialist who uses the water for cooling purposes, as process water, and for the disposal of treated wastes; for each and every citizen of Maryland--whether or not he has any direct interest in the waters of the State.

To carry out this complex function in a just and realistic manner, the Commission must first collect reliable factual data, then interpret this data by comparison with the established regulatory standards, and, where necessary, exercise its judgment to effect the abatement of pollution in the interest and for the greatest benefit of all the people of the State.

It is recognized that a control program which is to be reasonable as well as effective, must be characterized in large measure not simply by the application of regulations, but also by the exercise of sound judgment. Judgment is needed to determine, for example, what is reasonable as a control standard. Judgment is required to ascertain the practicable, that which can be accomplished by available means. Judgment is essential in delineating the best usages of various waters of the State. In fact, a program of water pollution control that is to serve the best interest of all the people of the State, must of necessity be guided by sound, carefully considered judgment.

So far in this discussion of Commission policy the general aspects of regulatory control, those aspects which cannot be numerically fixed or specifically defined, have been discussed at length. However, a great deal of Commission activity relates to situations and problems which can be satisfactorily controlled by the application of specific standards, such as the numerical standards of Regulation IV. The importance of such specific standards cannot

be underestimated, since these standards alone make possible an extensive, practical control program when this must be carried out by a small staff operating on a limited budget. Undeniably, the equitable application of specific standards, is an important facet of Commission policy, where these specific standards produce satisfactory results while still maintaining previously discussed precepts of reasonableness, practicability, and greatest benefit to all the people.

Thus the policy of this Commission has its general and its specific aspects. It is a broad and general policy, so that it may be reasonable and applicable to all contingencies which include the out-of-the-ordinary situation. It can be a specific, definite policy where this specificity does not detract from the lawfulness and soundness of its application. But such policy is meaningless unless it is implemented by means of an appropriate program for the control of water pollution. It is considered that the following factors constitute an important part of such a program:

1. reliable data and information showing the condition of waste discharges and of receiving waters
2. reliable data and information showing the effects of such discharges in the waters of the State
3. best prevailing usage and anticipated future use of the waters of the State
4. evaluation of data and information by reference to the appropriate Commission regulations
5. administrative judgment to determine necessary corrective action
6. resolute efforts to obtain voluntary compliance and cooperation, and
7. resort to the sterner measures of law, where this becomes necessary.

It is deemed that such a program would carry out successfully the established policy of the Commission, and would constitute a carefully considered, reasonable, and practicable course of action.

Pollution Control in Accordance
With Policy

Acquisition of Information

It would appear self-evident that abatement of pollution of the waters of Maryland must be accomplished through a demonstrably sound plan, based upon comprehensive knowledge of all relevant facts and serving the interests of the entire State. The Commission must become fully apprised of: (1) the existing conditions and essential characteristics of all State waters; (2) the causes and the sources of conditions that are not satisfactory; (3) the predominant uses and probable future uses of each stream and body of water, and of portions thereof where use is not uniform; (4) all industries, municipalities and other groups which use the streams as a source of water and as a depository for wastes, and the nature and requirements of such uses; and (5) all other conditions and facts, such as the engineering detail and financial aspects of waste water treatment, which together will determine a practical, realistic program for the control of water pollution.

Commission policy which lacks such a practical purpose or such basic factual foundation as that indicated will fail to command either voluntary support or judicial decree, and to the extent of such inadequacy, will fail.

Utilization of Information

Upon the basis of information gathered as above, and from time to time as the extent of this information permits, the Commission will formulate the following criteria and standards:

1. establish for its own guidance, but not by regulation for uniform application, criteria of minimum water qualities required for designated existing and probable future uses
2. establish for its own guidance, but not by regulation for uniform application, standards of water quality considered desirable or necessary of attainment for the existing and probable future uses of the waters of the State

3. establish by regulation to be uniformly applied to all State waters, criteria which will insure a condition of cleanliness above the nuisance level--how far above it to be determined after a thorough understanding of the purpose to be served--and which will conform to basic State plans and policies as implemented by the various cognizant agencies, so that standards established and enforced in various areas will not be in conflict therewith.

The criteria and standards established as above may be modified from time to time as study and experience indicate.

Implementation of Policy

Policies established by the Commission should be implemented in the following manner:

1. by communication to the general public through all possible means
2. by communication to persons and groups which will be affected, by means of written statements, addresses at meetings and individual personal contacts
3. by efforts to obtain voluntary compliance, as specified in the law
4. upon failure of such efforts, by compulsory Commission orders and judicial decrees.

It is believed that cooperative activity with industries and municipalities will yield greater benefits in pollution abatement than dependence primarily on compulsory orders and legal actions. Except in special circumstances (for instance oil pollution by transient vessels), criminal penalties should be invoked only as necessary. With a reasonable program in operation and the power of the enforcing agency established, actual results will be obtained more readily by education and cooperation than by peremptory orders and litigations.

Matters of Function and Administration

The Commission

The major function of the Commission will be the establishment of policy, according to the provisions of law and on the basis of data presented,

and the conducting of hearings required by the Act which created it. No basic questions of policy, including proposed regulations and orders, should be presented to the Commission for action at any meeting unless they are presented to each Commissioner in writing in advance, together with supporting data. It is considered exceedingly important that mature consideration of accurate information form the basis for all Commission action.

The Director

The function of the Director of the Commission will be to carry out the policy determined by the Commission, enforce the Water Pollution Control Law and the regulations established by the Commission, perform such other duties as the Commission may delegate to the Director, assume administrative charge of Commission activities, and supervise and direct the work of the Commission staff.

In addition to performing the customary functions of that office, the Director will: (a) foster good-will and confidence with industries, municipalities and other groups by personal contacts, conferences and addresses at meetings; (b) enforce Commission orders as directed; (c) acquire and keep up-to-date by correspondence and personal conferences information concerning the policies and methods of other states and particularly states adjoining Maryland; and (d) submit to the Commission for its consideration and action, recommendations for such improvements and revisions of Commission regulations and policy as are deemed necessary, so that Commission activities may ever be an up-to-date, realistic and equitable approach to the water pollution problems of this State.

Commission Meetings

As required by the Water Pollution Control Law, meetings of the Commission will be held at least quarterly, and more frequently when deemed necessary by the Commission or its Executive Committee.

Advisory Committees

The Commission may appoint, as the need arises, a permanent Executive Committee to assist it in the establishment of policy and to assist the Chairman in the administration of intra-commission affairs. Its membership should be small, limited to three members, and should be rotated to substitute a new member annually in order to spread the work. The Chairman of the Commission will be its chairman and the only nonrotating member.

The Commission may also foster the creation of advisory committees representative of industries and municipalities as follows: (a) Industrial Advisory Committee and (b) Municipal Advisory Committee. Other committees may be added as need or occasion arise. These committees will be of considerable assistance in the following aspects: (1) constitute a channel through which the Commission may disseminate information as to committee policy and action; (2) assist the Commission in the collection, correlation and evaluation of basic information; (3) assist the Commission in the formulation of policy through recommendations based upon such information; (4) assist the Commission in the implementation of policy upon the basis of self-interest in water suitable for industrial and municipal use; and (5) assist the Commission in research by voluntary research projects.

Regulations: An Extension of Policy

General Remarks

Regulations may be considered as tools, tools fashioned and molded by this Commission on the basis of all available data and the best engineering knowledge to be practical and effective in controlling the water pollution problems in Maryland. When regulations are considered in this way, it is soon realized that, like tools, regulations must be well constructed (carefully worded), designed to accomplish the work effectively (control pollution adequately), must be kept sharp (up-to-date), and that different types of tools will

be needed for different work (the equitable control of water pollution depending on best usage of the waters and other factors).

In the establishment of such regulations, the Commission should be certain that those to be applied are not only technically attainable but also that they are financially feasible, so as not to impose upon the State's industrial and municipal economy an expense which is out of proportion to the benefits sought.

It follows from the foregoing that the Commission should not seek to adopt or enforce a uniform standard over the entire State, except the minimum indicated. Any single standard might be inadequate for some uses and unnecessary for others, hence unreasonable in both cases. Since uses vary, standards should vary. The only single standard which would serve all uses is that which would serve the highest, and no survey is required to establish that the application of such a standard would be ruinous to the industrial and municipal economy of the State. To bring all of the waters of this State even to a minimum degree of cleanliness will cost the municipalities (i.e., the people) and the industries of this State huge sums of money, and cleaner waters will cost still larger sums. Disregard of these facts in setting the degree of cleanliness to be established would be reckless indeed. The relation of standards or regulations to uses and to economic factors has been widely recognized in other States of the Union, as well as in Maryland.

Regulations I & II

It was recognized early by the Commission that certain regulations must be established without reference to the usage of the particular waste receiving waters and without reference to the economic aspects of correction. In order to prohibit gross impairment of State waters, the Commission promulgated Regulation I, which makes unlawful the discharge of oil, except in case of emergency imperiling life or property, collision or unavoidable accident,

and Regulation II, which makes unlawful the discharge of garbage and food containers.

There certainly can be no quarrel with the plain and straightforward warning embodied in Regulations I and II that the State will not tolerate the wanton despoilment of its waters by such noxious materials as oil and garbage.

Regulation III

This control standard, applicable to all food-processing and food-packing plants in Maryland, went into effect on June 1, 1948, and required the elimination of all solids coarser than 1/32-inch mesh from food plant waste discharges. It was recognized in this regulation that the elimination of these solids from State waters constituted minimum treatment requirements and that the presence of other deleterious constituents or characteristics might require additional and satisfactory treatment.

On June 6, 1952, in order to provide more adequate control over the discharges from the food packing and processing industry, and to eliminate from the waters of the State objectionable characteristics aside from solid matter, the Commission declared Regulation III obsolete and withdrew all action under the regulation effective that date. Instead, Commission Regulation IV was made applicable to all industries previously governed by Regulation III.

Regulation IV

The purpose of this regulation is the control of water pollution caused by the wastes from industrial establishments. Primarily, Regulation IV may be termed an effluent standard, that is to say, the condition of the effluent is controlled before entering State waters. This regulation is not a fixed standard, but provides the flexibility necessary to fit the out-of-the-ordinary situation.

Admittedly, there are many ways that the task of water pollution control may be attacked, and that regulations for the control of industrial

wastes may be formulated. In 1948, when Regulation IV was first issued, the Commission felt that an "effluent standard"-type regulation would, at that time, serve best the interest of the people. Experience during the ensuing eight years has demonstrated that this regulation is a useful tool for water pollution control.

The numerical limits specified in Regulation IV, with adjustment for the out-of-the-ordinary situation as permitted by the regulation, will normally differentiate between satisfactory and unsatisfactory discharges to many waters of the State.

Since its inception, Regulation IV has been amended and adjusted five separate times, whenever the attention of the Commission was directed to a way in which the existing regulation might be improved. It is to be expected that Regulation IV may be further revised in the future as changes in the art of stream pollution control indicate a need for revision.

An inventory of the advantages of Regulation IV in the water pollution control program of the State might be of interest:

1. It is a specific requirement of the Water Pollution Control Commission and provides industry with a specific goal which must be achieved in waste treatment efforts as well as a ready and simple means of determining and checking pollution as defined by the Commission.
2. It is not unfair or unreasonable for a large number of industries in Maryland.
3. It is subject to adjustment so that it is fair and reasonable for industries where location, operation, water usage, and other factors make for an out-of-the-ordinary situation.
4. It provides the small staff of the Water Pollution Control Commission with an excellent administrative means of determining compliance or non-compliance with the pollution control program.
5. Because it is relatively simple to make the analytical determinations and detect pollution as defined by this regulation, the people of Maryland have benefited by the rapid, initial strides the Commission has been able to make in the abatement of water pollution.

Regulation V

This regulation--which was approved by the Commission on March 7, 1952, and became effective on June 1, 1952--requires the submission of reports from new industries for the discharge of industrial waste and provides for the issuance of certificates of approval for the construction or alteration of industrial waste treatment works.

Any person desiring to discharge industrial or other wastes or to alter the quantity or quality of any discharge or to construct or alter any treatment works for such a discharge must first file specified information with the Commission and seek and obtain a certificate of approval.

The purpose and policy for such a regulation is self-evident. Adequate control of water pollution, if it is not to be arbitrary and unreasonable, must have as its foundation solid, reliable data. The purpose of Regulation V is to provide the Commission with this vital information.

Regulation IV-A

This regulation represents a considered effort by the Commission to provide a control standard to fit the requirements of a particular and a unique area of the State. The Baltimore Harbor area is unique because it is a large body of tidal, saline water that can enormously dilute, disperse and assimilate industrial wastes. It is unique because its major use is for navigation and industrial purposes, and as such it is of great economic benefit to Baltimore City, Baltimore County, Anne Arundel County, and to the entire State of Maryland.

Regulation IV-A is in conformity with the Water Pollution Control Law which requires that water quality standards be "reasonable", "practicable", and take into consideration "the public use to which they (the waters of the State) are or may be put."

Regulation IV-A is the logical consequence of an extensive study made

by qualified engineers. Beginning in 1947, and ending in 1952 with the publication of "A Study of Water Quality in Baltimore Harbor"^{1/}, an intensive and important analysis was made of the pollution problems of these waters. In the conclusions of this report, the author states:

"In order of economic importance, the primary uses of water in Baltimore Harbor are for navigation, waste disposal, industrial water supply and recreation."

"The Patapsco Estuary appears to have the ability to assimilate much greater loads of organic matter and acid than are being discharged at present. Degraded conditions are occasioned in limited peripheral areas by imposition of waste loads in excess of local assimilative capacities."

"Existing conditions can be improved by transferring pollution loads from peripheral areas of limited assimilative capacities to the principal fairway, or by abating local waste discharges."

"There is no indication that waste disposal as normally practiced in the area has any significant effect on water quality in Chesapeake Bay outside Baltimore Harbor."

In line with the aforementioned conclusions, the Commission believes that its general standard for the control of water pollution, known as Regulation IV, cannot be equitably applied to the waters of the Baltimore Harbor area, and that any attempt to do so would violate the express provisions of reasonableness and practicability of the Law. Any regulation now being applied to distinctly different and comparatively smaller bodies of water would not be a proper tool for the control of pollution in the Baltimore Harbor area.

Regulation IV-A, however, satisfies the implications of the Harbor study and meets the provisions of the Law and the requirements of the area by taking into consideration the actual effect of discharges on the receiving

^{1/} "A Study of Water Quality in Baltimore Harbor," by Chesley F. Garland, published by the Department of Research and Education, Solomons Island, Maryland, in September, 1952, as Publication No. 96. This study was carried out at the Johns Hopkins University under the Department of Sanitary Engineering and Water Resources.

waters. Regulation IV-A establishes reasonable receiving water quality standards as well as general effluent characteristics, as follows:

1. It establishes practical Receiving Water Quality Standards for solids, pH, toxic wastes, oil, deleterious substances, colored wastes, and other wastes, as the primary criterion for the control of water pollution.
2. It establishes reasonable Desirable Effluent Characteristics for solids, toxic compounds, pH, and oils and greases, which are readily met by many industrial establishments, and which can serve as a ready measure of compliance and control.
3. It further states that where the Desirable Effluent Characteristics cannot be met, discharges will still be permitted if the Receiving Water Quality Standards can be satisfied.

It is believed that this regulation makes possible the "practicable and reasonable" control of water pollution in the Baltimore Harbor area.

Conclusion

It is the continuing policy of the Commission to effect the greatest possible abatement of water pollution commensurate with the maximum benefit to the people of the State. To accomplish this, the Commission has established a program which utilizes reliable data and information on the condition of waste discharges, and on the effect of such discharges on the waters of the State; which evaluates the data and information by reference to regulatory standards using, at all times, administrative judgment; which seeks corrective action through voluntary compliance and cooperation; and which uses the full power of law where this becomes necessary.

This policy and program for the control of water pollution is sufficiently broad and flexible so that action by the Commission in all instances is reasonable and practicable.

APPENDIX E

REPORT OF THE DEPARTMENT
OF TIDEWATER FISHERIES

Legislative Authority and Responsibilities

Legislative authority for the present activities of the Department of Tidewater Fisheries is contained in two Acts recently passed. The first was the law of 1959 reorganizing the Department and creating a new Commission. This law is in Article 66C of the Annotated Code of Maryland, 1957 Edition. The second law was the addition of a new Article, 14B to follow immediately after Article 14A of Section 224 of Article 66C of the Annotated Code of Maryland, 1957 Edition, commonly known as the Boating Act. In addition to the above laws, there are numerous laws passed from time to time, both local and State-wide, governing the production and marketing of seafoods of all kinds, for which the Department of Tidewater Fisheries is charged with responsibility.

Major responsibilities of the Department of Tidewater Fisheries are involved in the enforcement of all laws, and regulations incident thereto, governing the catching of crabs, fish, oysters, hard clams and soft clams. Also, the Department is charged with the responsibility of enforcing the provisions of the Boating Act and of issuing regulations for the governing of boating under that Act.

A special committee of the Legislature has been appointed to make a study of laws and regulations governing the seafood industry. This committee is to consider changes in laws, establishment of new laws, and make recommendations to the 1961 session of the Legislature. The Tidewater Fisheries Commission, which governs the Department, has been holding hearings all over the State and probably will continue to do so. The enforcement of the Boating Act on the tidewaters of this State is under jurisdiction of the Tidewater Fisheries Commission, but on the non-tidal waters of this State the Game and Inland Fish has that responsibility.

Present Policies and Programs

The Tidewater Fisheries Commission is somewhat stultified in formulating policies because of many restrictive laws.^{1/} Its policies, so far as it is able to make them effective, under existing law, encompasses almost every phase of development that relates to the rehabilitation of the seafood industry.

Various programs now being carried out by the Department of Tidewater Fisheries:

1. Efforts along different lines, looking particularly toward increasing largely the supply of oysters. This involves the growing and planting of seed and heavy plantings of shells on public rocks.
2. Studies relating to shad and rock and other kinds of fish looking toward management policies to conserve the supply of fish and not to allow the Bay and its tributaries to be overfished. The objective is to take such steps as should lead to a continuing adequate supply.
3. A general survey of the Bay and its tributaries and surveys of bottoms to determine what are natural rocks and what are barren bottoms, and also surveys for the leasing of oyster bottoms.
4. A division of marketing in which attractive packaging, processing, and preserving, and creation of new markets, and holding old markets, for all kinds of seafood are the objectives. Also, this division will be interested in invasion of Maryland markets by foreign seafoods. Also, the development of consumer interests in the kinds of seafood not now generally used.
5. Additional programs, both for in-service training and for keeping watermen and buyers informed as to the best developments in the seafood industry.

^{1/} The Department of Tidewater Fisheries is stultified in formulating policies because many restrictive laws prevent it putting into effect policies that obviously are necessary if the seafood industry is to be successfully rehabilitated on a sound and broad basis. For instance, there are some local places, Dorchester County for instance, in which it is impossible to rent land for planting of oysters because a law was put through preventing such action for a period of five years. There is a Maryland and Virginia law in relation to the Potomac River Compact which will prevent leasing of grounds and leasing by cooperative groups of watermen, which is one of the main proposals of this Commission. The Department, in regard to size of fish, finds that both Virginia and Delaware, on each side of Maryland, have laws regulating the size of fish that are different from Maryland. This creates many difficulties in relationship to marketing of fish, as it prevents Maryland enforcing its own law which is more stringent than either the Virginia or Delaware law. There are innumerable instances in the law of this type.

6. The Division of Law Enforcement, which has responsibility for protecting the interests of watermen and for patrolling the public rocks and enforcing the numerous laws that are on the books relating to the taking of seafoods of all kinds.
7. Carrying out the Division of Recreation and Boating, which is charged with the responsibility for administering the Registration and Numbering Act, commonly called the Boating Act, enacted by the last Legislature. Under this, all boats in Maryland carrying Coast Guard numbers will be registered and numbered under Maryland law. Any excess funds accruing in this Division, after all administrative costs are paid, will be used for projects beneficial to the boating fraternity, which may be the dredging of a harbor, location of public ramps, or fostering of regattas in cooperation with established marine recreational facilities.

Present and Emerging Problems

The greatest present problem relative to the rehabilitation of the seafood industry is to carry on such an educational program as will create confidence in watermen, in the program itself, and also will result in larger production of oysters. Another difficult problem is to provide an adequate law enforcement program to protect the watermen, the packers, and also the work that the Department itself carries on.

The greatest problem of all is likely to be that of pollution. This is going to require not only intensive study, but also some kind of remedial action.^{1/} In addition to the above, there is a considerable amount of experimental work to be developed, which should provide answers to some of the problems of producing, processing and preserving.

^{1/} Our proposed study of pollution would not interfere in any sense with the work of the State Department of Health, but would be coordinated closely with it. Our study of pollution would relate almost entirely to the growth of obnoxious weeds and grass in the streams of the State, and the growth of other forms of aquatic vegetation that not only pollutes the water pretty badly but prevents its navigational use. Our work in coordination with the State Department of Health already is being carried on by assisting them through furnishing of boats and other help in their study of pollution of waters from human secretion and pollution in other ways deleterious to health of human beings.

In the recreational field, no particular administrative problems are expected, but there is an outstanding job to be done in educating people on the question of safety of life and property on the water.^{1/} A different concept of research is badly needed and is a present problem of considerable proportion.

Long-Range Objectives and Program Goals

As far as long-range objectives are concerned in the field of marine life, these are not as important as some of the short-range objectives. Educational work in safety and security on the water, for those that enjoy water recreation. Development of a cooperative program with other States, and particularly with the State of Virginia. A good deal of success of a long-range program depends on treatment of the Chesapeake Bay and its tributaries under one policy of management.

It is not expected that there will be any immediate revision of present policies, and it is unlikely that many new policies will be evolved in the immediate future. This revision and initiation of new policies has been taking place over the past year and is beginning to jell into stable objectives and methods of reaching those objectives.

A special committee of the Legislature has been named by the Legislative Council to make a study of the legislative problems, and this study probably will result in recommending a considerable number of changes in the law governing tidewater fisheries. There are one or two top-level administrative problems that could, and probably will, be met before very long. Especially is this true in relationship to research.

^{1/} In regard to safety of life and property, the Department has been making a rather broad study of this and is using many different authorities and is preparing a pamphlet for this purpose to disseminate among boatmen in all sections of the State.

Data Collecting, Research and Planning

The Department has been the agency for collecting data on the catch of fish for commercial fishermen. It has been responsible for data relating to taxes on shells, licenses and production of oysters and crabs. There are other types of needed data that it is hoped arrangements will be made to obtain shortly.

The Department of Tidewater Fisheries has never carried on research in its own personnel. There was a period when research was under this Department, but some years ago was removed and made an independent unit. This was a mistake, as research actually is a function that largely stems from management problems.

The Department is beginning to plan a study of the Bay and its tributaries with regard to recreational possibilities.

STATEMENT OF
DR. H. C. BYRD BEFORE
SPECIAL COMMITTEE OF
THE LEGISLATURE

Broader Powers For Commission

Under present law it is difficult for the Commission on Tidewater Fisheries to use its best judgment in many matters. Disparity in the opening and closing of seasons in different parts of the State; granting of 30 days of grace in paying for oyster licenses; use of gill nets for commercial fishing without licensing, are examples of easily answerable criticisms about which the Commission can do nothing because of laws now on the books. What is needed is to follow the lead of agriculture in 1916 when it prevailed upon the Legislature to adopt a broad general law, with proper restrictions, with a good deal of latitude left to the State Board of Agriculture to handle such specific matters as might arise. That plan has since worked well in agriculture and it should work well in relation to the seafood industry. An exhaustive study of present laws is necessary and we hope, Mr. Chairman, you will appoint a special subcommittee to make such a study. Also, the Committee should study what seems to be unnecessary laws, for instance the one that provides that no one in the District of Columbia shall fish in the Potomac River.

Research Activities

A research laboratory is primarily a tool. It is unthinkable that Maryland should maintain two seafood research laboratories, each of which is completely independent of the State Commission which is charged with responsibility for the development of the seafood industry. Actually, for most of its existence, a period of more than thirty years, one of these laboratories

exercised almost complete authority in the State's efforts to help the seafood industry. It apparently wishes to continue this status without accepting the responsibility that goes with mistakes and failures. We are opposed to this kind of procedure, and ask that your Committee study the records of these research laboratories to ascertain what their programs have been, what they have actually contributed in constructive leadership, and determine whether or not they should be continued as independent units or as a part of the Commission charged with responsibility for work for which they should serve as tools. Our Commission should state its views on this question and we presume you will also seek the views of the two laboratories.

Laws Governing Fishing

Present fishing laws were enacted undoubtedly with the intent of restricting fishing rights to prevent overfishing the bay and its tributaries. This would appear to be sound policy, but modification of the laws, especially regarding the issuance of licenses, should be considered in order to give the Commission authority to prevent injustices and to be helpful in cases of hardship.

Sports Fishing

Sports fishing has developed in recent years so that the present expenditures, and gross income therefrom, have reached large figures. Those interested - and there are many - are demanding more consideration than they have been given in past years. We should consider what measures might be taken to reconcile the differences between the sports fisherman and commercial fisherman. While our Commission is committed primarily to those that make their living out of the water, it must be remembered that, considering the party boat captains, those that hire out small boats, those that catch and sell bait, and others in similar categories, constitute a total number who make their living out of the

water far larger than the number of those we commonly designate as commercial fishermen. The so-called sports fishermen and those that depend upon the money he spends are a growing number and are entitled to be heard and considered.

Survey of the Bay and Tributaries

The proposed survey of the Bay and its tributaries shortly will get underway, if it is not already. The survey is to be made by the U. S. Coast and Geodetic Survey under an agreement that will save about \$75,000 for the State. The total cost will be about \$135,000 of which \$60,000 will be paid by the State.

Reclassification of the oyster bottoms will be carried on somewhat simultaneously with the general survey. However, reclassification will be almost impossible unless there is repealed a law now on the books which makes reclassification extremely difficult if not almost impossible. Authority should be given the Commission to designate what are natural oyster bars and barren bottoms.

Close Oyster Bars

Authority should be granted the Commission to close and open natural oyster bars to give them a chance to rehabilitate themselves, especially those bars on which there is not a sufficient quantity of shells available to plant adequately.

Taxes on Seafood

The question of taxes on oysters and other seafoods might well be studied. Some questions that come to mind are:

1. Is \$1.00 per acre per year sufficient rent to charge for leased ground?
2. What are the purposes of license fees and taxes and for what purposes should such income be used?

3. Should each county issue licenses or should all licenses be issued from a state central point on a State-wide basis?
4. Are all license fees equitable?
5. Should a packer be taxed half the shells he gets from shucking oysters?

There are many, many other questions of this nature.

Clam Laws

The laws governing the taking and sale of clams are in some respects chaotic. Some conditions in relation to clam laws are indicative of what can happen when each county puts through legislation seeking to protect its own interests instead of fostering legislation on a State-wide basis looking upon the seafood industry as a unit. You may wish to grant the Commission authority to handle local situations through regulations, which may be established, modified, or rescinded readily as conditions may warrant. The clam laws need a thorough study by a special committee which understands the catching and marketing problems involved.

Disposition of Leases and Licenses

In the matter of issuing licenses and making decisions about leases, the following questions should be cleared in the law:

1. How long should the name of a person who has died be carried on the list of those holding oyster leases?
2. How long should a lease of oyster ground be regarded as valid when rent is not being paid?
3. When the word resident is used how should the word be defined for purposes of leasing ground?
4. What should be the legal age of a minor for granting of a lease of oyster ground?
5. Is a lease or a license personal or real property or a privilege granted an individual for his use and not to be left after death or transferred during life to others?

6. How long, if at all, can an administrator of an estate hold a fishing license without making some disposition of it?
7. The law provides that leases may be granted for oyster bottoms, but much ground seems to have been leased on which neither oysters nor shells have been planted. The rights and conditions of forfeiture of such leases should be defined in the law.

These are some of the questions with which your Commission is confronted.

Crab Industry

There is no doubt that the crab industry is in bad shape, and what conditions have caused it and what should be done to increase the supply are questions which give rise to many conjectures. Following are some of the main reasons given for the scarcity:

1. Catching of millions of female crabs during the winter months, after they go into lower part of the Bay to bury during these months. Both Virginia and Maryland Packers consider this as a major cause.
2. Overfishing in creeks and rivers catching a great many peelers and thus preventing shedding and future growth.
3. Use of too many kinds of efficient gear, such as traps and pots. These are said to result in catching a good many small crabs that should be left to grow.
4. Eating of a good many small crabs by rock fish. A rock fish cut open the other day had 17 small crabs in its digestive organs.

Some there are who claim that crabs are not as scarce as they seem, because a great many are being sold direct from catchers to trucks to be hawked to restaurants, bars, etc., along the highway through Delaware and Jersey.

But whatever may be the cause, we know that crabs are scarce, and that business in this field has begun to move from Maryland to Florida. This being true, your committee most certainly will wish to consider seriously the situation, and take such steps as may seem to be warranted. In this particular situation, some kind of united action by Virginia and Maryland is essential. Restrictions on gear now used, setting of time in which crabs may not be caught, and other measures will undoubtedly come under consideration by you.

Anglers License

Last winter the questions, pro and con, about adoption of an anglers license for salt water fishing were discussed. Decision was reached to drop the subject. Now, the matter is again being mentioned. Many arguments are being offered on each side of such a proposal. You will probably wish to consider the question, to learn the differing opinions about it, if not to consider seriously approval of such a license.

Differences Among Watermen

We all know that differences among watermen exist and in some cases "run deep." One waterman of long experience has observed to me that these differences are so irreconcilable that they can never be settled. We should not accept this view. These differences arise from one factor, competition in attempts to earn a livelihood. No competitive interests ever were so completely at loggerheads as to defy solution of the problems involved. It may be necessary to change the backgrounds that cause some of these difficulties, but a way must be found to coordinate the interests of watermen. There are many businesses in which the competition is severe but all involved work closely together, pull the same oar, when their business as a whole is threatened.

Conclusion

We have briefly placed before you some of the problems that confront your Commission. Some of the implications in the questions we raise will undoubtedly cause objections. We shall be glad to answer objections of any kind. However, we point out to you that the objections will probably come from those whose influences have over many years prevented the growth of the oyster industry, and have led the industry into its present depleted state. After continuing and increasing failures over many years, we respectfully ask if it is not time to try another plan.

APPENDIX F

REPORT OF THE DEPARTMENT
OF GAME AND INLAND FISH

Legislative Authority and Responsibilities

For Legislative authority and responsibilities of the Department of Game and Inland Fish, see Annotated Code of Maryland (1957), Article 66C; Sections 113, 114, 115, 116, 186, 190, 191, 192, 193, 226 and 227. The Department is the administrating agency for Federal Aid Funds (Pittman-Robertson and Dingell-Johnson Acts) under Federal supervision.

Present Policies and Programs

The policies of the Department as related to game are the following:

1. Cooperate with land owners, and other State Agencies and Federal Government in developing water resources for use of various forms of wildlife.
2. Cooperate with other State and Federal Agencies in studying current problems of tidewater environment which may affect wildlife, particularly waterfowl.
3. Develop the water resources of Commission-owned lands for use of wildlife.
4. Cooperate with the Soil Conservation Service in seeding and planting spoil banks of drainage projects and farm pond watersheds with food and cover plants for wildlife and erosion control.

The various programs now being carried out to effectuate these policies of the Department and to discharge its responsibilities under the law are the following:

1. Wetland Development Program. Creation of areas of shallow water on fresh water streams and tidal marsh to favor wild waterfowl and furbearers. These small marsh areas are being constructed on State and private lands where suitable sites are available. Some are managed on an annual drawdown in the summer basis and reflooded in the fall, while others are maintained at a permanent level. Tidal marsh is inundated with several inches to a foot of water by diking and placing water control structures

in small tidal streams.^{1/}

2. Development of Watering Ponds for Wildlife. This program consists of excavation of small holes (usually 20' X 20') on State-owned and private lands where free water is not available during summer months. These holes are dug in areas where a high water table insures the constant presence of water.
3. Under a memorandum of understanding, the State Roads Commission will cooperate with the Department of Game and Inland Fish in developing small marsh areas or public fishing lakes where road construction in the vicinity of streams and water courses provides the opportunity for economical installation.

The policies and programs of the Department as related to inland-water fish are the following:

1. Research and Investigation. To aid formulation of management program.
2. Resource Management. (a) establish seasons, size limits, creel limits and other regulations to perpetuate the inland fisheries; (b) habitat improvement involving rough fish control, fish population manipulation, fertilization of waters to increase fish growth, chemical control of noxious aquatic vegetation, corrective stocking, installation of fish cover, installation of attracting devices; (c) habitat preservation involving collaborative work with Water Pollution Control Commission to prevent loss of valuable fish habitat.
3. Fish Culture. (a) maintain one modern hatchery and two rearing stations for trout; (b) operate two warm water hatcheries and rearing stations for bass, bluegill and other species; (c) enter into agreements with and receive from Federal Government and other State and private interests fish for stocking and rehabilitating inland waters; (d) test and employ proven new methods of fish culture, stocking and disease prevention; (e) conduct educational tours of fish hatcheries for teachers, students, conservation groups and general public as part of operations.
4. Extension Aid. (a) to pond and lake owners throughout the State; (b) inform conservation clubs and interested individuals concerned with fish conservation; (c) aid public relations unit by preparing newspaper, magazine, radio and television productions relating to inland fish.

^{1/} Expensive or large projects in wetland development are sometimes carried out with Federal Aid. To date, only marshland development projects have been accomplished with the engineering, biological and financial assistance of the Fish and Wildlife Service.

Present and Emerging Problems

The important present and emerging problem areas in the water resources management field confronting the Department are the following:

1. Proper recognition of fisheries and wildlife management as a co-equal user of inland water resources constitutes a major problem. Conflicts arise because of antiquated concepts of primary or sole use, or administration by a single non-comprehensive agency which does not clearly recognize the legitimate right, economic need and moral obligation to keep the State's inland waters at the peak of their qualitative and quantitative productivity for fish and game as food, and for the recreation of the citizens of the State. Reservoir, stream and river system habitats should not be allowed to continue to degenerate for fish and game production, under the guise of providing for the State's or Nation's economy. To do so would be foolhardy economics in the long run. Wildlife organisms have certain tolerance levels beyond which they are unable to live or provide for substantial harvests which are desired by Marylanders. (See Attached Report, "Comments Relating to Proposed Discharge of Water of High Temperature Upon the Natural Resources of the State of Maryland in the Potomac River near Dickerson, Montgomery County.")
2. Securing additional competent personnel for modern wildlife and fishery management needs.
3. Financing all phases of a diversified program.
4. Additional research is needed to improve the state of knowledge of ecological relationships of fish and wildlife.
5. Infestation of certain areas of the Chesapeake Bay and tributaries with pest plants which interfere with recreation and crowd out beneficial or more valuable waterfowl food plants. Example: water chestnut, eurasian watermilfoil.
6. Pollution and siltation of fresh and tidal waters downgrades waterfowl and fish habitat by impairing growth of natural foods.
7. Possible effects of industrial or residential development of lower Susquehanna River area on the Susquehanna Flats should be studied very carefully, since this area is one of the most important on the East Coast for wintering waterfowl. The same applies for the Eastern Neck Island area of Queen Anne's County in particular and for the entire Chesapeake Bay area in general.
8. Mosquito control activities must be coordinated with waterfowl and wildlife management activities in an effort to accomplish the former without doing irreparable damage to the natural habitat of fish and wildlife directly.

9. Habitat improvement of inland waters is needed in order to produce desirable wildlife populations, provide for additions to the State's economy, and increase recreational values.^{1/} Aquatic habitat improvement will result in better water quality for domestic and industrial users. Stabilized stream flows are another direct result of habitat improvement.
10. Better use of inland water resources requires further knowledge and application of fish population manipulation.
11. Minimum stream flows are being reduced at critical periods by irrigation with adverse effects to wildlife.
12. Natural wetland habitat is being seriously reduced by draining and/or filling of swamps and marsh lands for mosquito control, residential, agricultural and other development purposes.

1/ The program essential to habitat improvement of inland waters is outlined below:

- A. Watershed Stabilization and Protection (to prevent erosion, retard run-off, increase water storage capacity of soils)
- B. Water Pollution Control
 1. Physical Control of Silt Deposition
 - (a) principle problem to be solved is control of erosion resulting from run-off waters from road and housing construction projects
 2. Control of Discharge of Injurious Chemicals
 - (a) mine acid discharges into Western Maryland waters, examples of immediate need: Youghiogheny River Basin and Upper Potomac River Basin
 - (b) discharge of industrial wastes
 - (c) domestic sewage treatment and disposal. Example: The Metropolitan Washington Area in Montgomery and Prince George's Counties
 - (d) immediate need for regulation of use of pesticides and herbicides which have been demonstrated to be harmful to fish and wildlife, as well as domestic stock.

(Frightening reports of studies of this problem may be found in the enclosed Proceedings of the Twelfth Annual Conference of the Southeastern Association of Game and Fish Commissioners, pages 233, 240, 244, 250, etc.)
 3. Control of Other Injurious Discharges
 - (a) water of elevated temperature
 - (b) radio active wastes from proposed nuclear plants

Long-Range Objectives and Program Goals

One long-range objective is to continue to foster the love of country exhibited by the present attitude of most of its citizens toward the conservation and wise use of fish and wildlife populations which form an integral part of the State's water resources. Fish and wildlife are self-sustaining; periodically, renewable crops are necessary to the survival and betterment of society.

Continued emphasis and effort must be directed toward the preservation, rehabilitation and improvement of wildlife habitat. The requirements for this necessity can best be determined by personnel educated in the sciences of physics, chemistry and biology. Investigation should be so organized that they are performed in the field by well equipped coordinated teams of research and management personnel. Basic laboratory research and exploratory applied research should precede and lay the ground work for progressive management in the field.

There will be need for even closer coordination between the Water Pollution Control Commission and the agency charged with administering fishery and wildlife resources. Pollution control engineers should be cognizant of the rudiments of fish and game requirements. Competent wildlife conservation personnel should be employed as participants of study programs for proposed non-fish and wildlife expansion which might seriously alter habitat.

Another principle objective is to protect and enhance our high standard of living, both cultural and material. To view fish and wildlife resources as being economically unimportant is grossly unrealistic. Actually, the present abundance of these natural populations contributes very substantially to the State's economy in the following ways: (a) provides employment for commercial fishermen; (b) promotes manufacture and sale of boats and marine

equipment; (c) promotes sale of hunting and sports fishing equipment used in harvesting the crop; (d) encourages residents and non-residents to spend money in the State for meals, lodging, gasoline, etc., in pursuit of recreation.

If, and when, fish and wildlife populations decline markedly, (they have in other states and can in Maryland), we can expect a corresponding decline in economic benefits associated with their existence. For example, the current all time high population of the striped bass in the Chesapeake Bay and its tributaries is in direct contrast to the now abysmally low population of salmon on the Pacific Coast which has resulted from mismanagement of water resources.

The Department of Game and Inland Fish envisages the day when science will make it possible to manage fish and wildlife populations so that they are more productive in a unit of time and space. Economic factors associated with our expanding human population will demand this.

Another objective is to increase the knowledge of water resource utilization, specifically as concerns fish and wildlife populations. For instance, agricultural science and technology in the United States are second to none. This is not true in water resource management of fisheries.

It is becoming increasingly important to develop the concept of multiple purpose waters where all users of this resource can operate harmoniously. Attached is a report to the Select Senate Committee on National Water Resources, dated November 24, 1959, by Director Vaughn, President of the Southeastern Association of Game and Fish Commissioners.

Encouraging promising young men and women to enter conservation careers by upgrading the status and pay of conservation jobs is of prime concern. It is expected that the future social and financial status of professional conservation workers will be comparable to that enjoyed by those in other technical fields.

The Department will continue to pursue a vigorous program of land acquisition for upland game and waterfowl and sites for fishing lakes. For modern needs, pond sites for fish should be near a minimum of 25 acres, preferable larger, (100 plus acres). There is an excellent opportunity to continue the cooperative planning and construction program with the State Roads Commission. As new highways are built some of the road banks can serve as dams, as for example, the Urieville Lake on U. S. Highway #213, on the Eastern Shore. This type of construction serves the multiple purpose of providing habitat for both wild waterfowl and fish. The coming increased utilization of wildlife and fishery resources will require increased parking and recreation-linked facilities. The development of "Fish for Fun" waters where there is no creel or a restricted creel should be considered for purely recreational purposes. Public shooting areas are becoming increasingly necessary as more land is diverted to other uses.

The Department anticipates the acceleration of fish population control by employing a reclamation crew or crews to remove and control undesirable fishes by chemical, netting and electrical methods.

Revision of Present and Initiation of New Policies and Programs

Revision of present and initiation of new policies and programs for the achievement of long-range objectives are discussed in the following.

Additional productive habitat must be created. More than one-half of the original 140 million acres of waterfowl habitat in the United States has been spoiled. Drainage for mosquito control has adversely affected 90% of the coastal marshland from Maine to Florida. Flooding of marshland rather than draining has proven to be highly successful in the control of mosquitoes. At the same time this practice creates optimum conditions of water and vegetation for waterfowl and in some cases fish. It is strongly urged that the officials

charged with mosquito control give serious consideration to this technique. (See Resolution No. 2, of "Report of Governor's Commission to Study Migratory Bird Laws," attached.)

Improvement of additional non-productive habitat is practical through the control of marsh needle-rush by the judicious use of herbicides, particularly in conjunction with impoundment of water.

Many areas of low swampy character which may be considered for drainage to provide agricultural land might easily be transformed into small marsh areas of high value to waterfowl. Experience indicates that frequently more benefit is derived from the latter practice. Close cooperation with the U. S. Department of Agriculture and in some cases a change of policy of this agency's Wetland Classification is necessary.

Since it is virtually impossible to create new habitat for diving ducks, preservation of existing natural feeding grounds in the Chesapeake Bay and its tributaries is of vital importance. Dredging operations and spoil deposition, and shore front development should be planned and carried out in such a manner as to cause a minimum of damage to feeding areas. Channel dredging and the need for areas to deposit spoil often provide good opportunities to develop coastal marshes by creating dikes with the excavated material. This practice is infinitely more desirable than dumping spoil on present feeding areas. Working agreement and liaison with agencies concerned with these activities is a continued requirement.

Additional effort should be directed toward establishing a pattern or network of waterfowl habitat in the important wintering areas of the Chesapeake Bay country. Cooperation with the U. S. Fish and Wildlife Service, Soil Conservation Service, other State agencies and private land owners will be necessary.

A policy to obtain control of lands and waters for public use through some type of lease arrangement rather than purchase in areas where real estate

values make outright purchase too costly must be implemented.

The preliminary plans for major impoundments on tributaries of the Potomac River in Allegany and Garrett Counties made by the Corps of Engineers and the U. S. Fish and Wildlife Service with the assistance of this Department offer promise of additional water resources which can be of direct benefit to fish and wildlife. Because the conference of Governors of the Appalachian States recently called by our Honorable J. Millard Tawes, emphasized the need for economic and cultural development in this mountainous region, the Department will strive to bring about the rapid construction of these impoundments.

The Department anticipates working with the National Park Service in restoring fish and wildlife as sections of the Chesapeake and Ohio Canal are rewatered.

Working agreements will be established with the controllers of municipal and power reservoirs in order to more effectively manage fishery resources.

Recommended Administrative
or Legislative Action

It is recommended that a clearing committee be appointed to study and advise the Governor and Legislature about proposed legislation which may adversely affect the fish and wildlife aspects of water resources administration. It is further recommended that this committee have the services of an aquatic biologist.

Because stream flow is often critically reduced by intensive irrigation or by restricted flow through dams, with serious consequence to fish and wildlife, it is recommended that a study be made to define minimum acceptable reductions in flow of permanent streams of the State and steps be taken to bring about conformance with the results of this study.

It is strongly recommended that top level administrative and legislative action be taken to support legislation along the lines provided in the

U. S. House Resolution 11502 which provides for control of widespread and indiscriminate application of pesticides which are causing serious damage to our fish and wildlife inhabiting the waters of Maryland. It is pointed out that human life is also seriously endangered by the uncontrolled use of these deadly toxins which can enter domestic water supply systems. (Attached is a recent resolution of the Southeastern Association of Game and Fish Commissioners.)

Data Collecting and Research

Outlined below is a listing and description of data collecting and research activities:

A. Listing of Activities

1. Federal Aid research projects under Dingell-Johnson Act for fish and Pittman-Robertson Act for waterfowl
2. State investigations
 - (a) cooperative research programming with Department of Research and Education
 - (b) coordinated research with Water Pollution Control Commission
 - (c) department research

B. Description of Data Collecting Activities

1. Cooperative waterfowl census by Commission and U. S. Fish and Wildlife Service
2. Banding of waterfowl
3. Survey of nesting sites
4. Enumeration of fish populations
5. Creel census
6. Tagging of fish

C. Description of Current and Projected Research

1. Current research
 - (a) life history studies of waterfowl

- (b) foods and feeding habits of waterfowl
- (c) sources and quantity of waterfowl foods
- (d) experimental control of aquatic pest plants
- (e) experimental fishery management methods in reservoirs
- (f) creel census to evaluate changed regulations
- (g) life history of the black crappie and white crappie in Maryland reservoirs, including age and growth rates, rate of exploitation, survival, food and utilization, movements, experimental methods of population limitation, and reproductive cycle
- (h) experimental methods to increase angler success
- (i) development of improved electrical, chemical and mechanical fish sampling devices

Attachment 1

COMMENTS RELATING TO THE PROPOSED DISCHARGE OF WATER OF HIGH
TEMPERATURES UPON THE NATURAL RESOURCES OF THE STATE OF MARYLAND
IN THE POTOMAC RIVER NEAR DICKERSON, MONTGOMERY COUNTY
(Potomac Electric Power Company)

GAME AND INLAND FISH

COMMISSION

March 18, 1960

Ernest A. Vaughn
Director

Edwin M. Barry
Chief, Fish Management

Report by: Albert E. Sanderson, Jr.
Fishery Biologist

PART I

HIGHLIGHTS OF THE POTOMAC RIVER FISHERY

1. The Potomac River represents a multimillion dollar State investment which has contributed substantially to the economy, health and education of our citizens.
2. With maintenance of adequate habitat annual crops of highly desirable food and game fish can be expected. The Potomac supports approximately 180 pounds of fish per acre in the area under consideration. Creel census interviews of anglers in the Dickerson area reveal one of the highest angling success rates in Maryland.
3. The Potomac in upper Montgomery County at this time is a healthy river which supports a wide variety and abundance of aquatic fauna and flora not to be found in the lower non-tidal reaches or the upstream reaches near Westernport where habitat destruction has resulted in serious consequences to human as well as wildlife populations.
4. There will be increased demand in the future for utilization of this State-owned resource for food and recreation.
5. Industry, the State and the federal government have spent large sums to preserve and restore the fisheries of the Potomac. The recent expenditure of approximately \$400,000.00 for the Little Falls Fishway is one example. The realistic and progressive attitude of the West Virginia Pulp and Paper Company is reflected in the improvement of their treatment facilities at Luke on the upper Potomac.

PART II

THE BIOLOGICAL PROBLEMS ASSOCIATED WITH
HIGH WATER TEMPERATURES

1. Fish and invertebrate aquatic animals are poikilothermous or "cold blooded." The organism can do little or nothing to adjust body temperature. It is subject to the changes imposed by the environment. If the organism is able and fortunate enough to escape from an unfavorable environment it may survive. If the stress is great and prolonged for a critical period there may be appreciable mortalities within a population. If the stress continues the population may survive, but at a much reduced level. If food organisms or spawning sites are destroyed by physical or chemical changes the population may ultimately disappear. The disappearance of trout, Salvelinus fontinalis, in some Maryland streams is attributed to a changed environment associated with now critically high water temperatures which occur periodically. The mean annual temperature of the streams has changed very little. Slight percentage changes in the average temperatures to which wildlife may be exposed are not nearly so important as the degree and duration of unnatural stress imposed by abnormally high or near lethal temperatures.
2. Fish populations of the Potomac are localized. Tagging of 5,681 fish including smallmouth black bass, channel catfish, yellowbelly sunfish and associated species in the river basin, including the area under discussion, demonstrates that the major species can be considered to have a local range. For example, 70 per cent of the River smallmouth recovered were at places within one-mile of the point of release. Similar localized populations for catfish and sunfish were indicated as a result of analysis of tag returns.
3. The species of fish abundant in the Potomac near Dickerson thrive in an approximate temperature range of 32°F. to 88°F. Near the top of this range many species of fish are under physiological stress. How is this stress demonstrated?

a. BY THE DISTRIBUTION OF FISH

Electrofishing studies conducted by the research unit of the Game and Inland Fish Commission as part of a cooperative program with the U. S. Fish and Wildlife Service reveal that at water temperatures of 85°F. and above smallmouth bass, channel catfish, rock bass and associated species seek the more highly oxygenated riffles. It is also in the riffles where heat exchange through evaporation, convection and radiation occurs at a rapid rate and the resultant stress is least. Pools, in contrast to riffles, show a lower dissolved oxygen content and a less rapid rate of heat exchange the rate depending, of course, upon the pool's physical configuration, chemical reactions and biological activities. With water temperatures at or near 90°F. the stress upon the fish population is even more strongly exhibited. Potomac fish at this temperature are highly influenced by the increased temperature and the proportion of fish in the riffles compared to pools is even greater than at the 85° level. Fortunately, under natural conditions these high temperatures are not prolonged or continuous during the summer months. Water temperatures above 90°F. are seldom encountered and have not been recorded during the Commission's studies for periods lasting as much as 48 hours.

b. BY THE DEATH OF FISHES KEPT FOR 8 - 24 HOURS IN TRAPS AND "LIVE BOXES"

Population sampling conducted in the Potomac in Frederick and Montgomery Counties demonstrated that with water temperatures exceeding 85°F., and approaching 90°F. at times, there was an appreciable mortality of the native fishes when movement from the area of capture was restricted. These extensive mortalities did not occur at the same site using the same gear when lower water temperatures prevailed. The mesh size used did not significantly retard the circulation of water.

c. BY THE DECREASED RECUPERATIVE POWERS EXHIBITED BY FISHES SUBJECTED TO ELECTRICAL STIMULI

Fish shocked in water 85°F. or warmer do not recover nearly as rapidly as those shocked at 70° - 80°F. This slower recovery is attributed in great measure to temperatures and gas exchange functions which control certain physiological responses. At temperatures near 90°F. some fish species failed to recover from the same voltage potential which did not cause harm at temperatures below 85°F.

d. BY THE PERIODICITY OF FEEDING

At elevated mean daily water temperatures of 82°F. and above small-mouth bass and other associated Potomac fishes exhibit changes in their feeding habits although the same food organisms are present at lower temperatures. The periods of heavy feeding generally occur late at night and in early morning when water temperatures are cooler. This does not mean that occasional fish cannot be caught during diurnal periods, but does reveal the effect of increased temperature upon the population.

4. In addition to the direct observations made on the site stated above in (3) there is a wealth of experimental data from which decisions can be clearly drawn. Fortunately many of the closely controlled experimental studies have dealt with species indigenous to the Potomac or to species very closely related, i.e., the same family or genus. Dr. Clarence Tarzwell, Chief of Aquatic Biology, Water Supply and Water Pollution Research for the U. S. Public Health Service has forwarded conclusions from experiments which show the half-population-life, also called median tolerance limit, for fishes experimentally subjected to the stress imposed by unusually highwater temperatures. (See Table I) In the book, "Biological Problems in Water Pollution" Dr. Tarzwell states, "In trout streams having high peak summer temperatures, suckers and minnows comprise the bulk of the fish population. Thus, while temperatures higher than the optimum and high temperatures of short duration

may not kill trout, they produce environmental conditions more favorable for the coarse fishes, which increase at the expense of the trout population. This fact must be taken into consideration in the establishment of temperature criteria for the cold water species. Such criteria must be based on optimum conditions and not on temperature tolerated by trout." The same concept regarding high temperatures applies to the smallmouth black bass of the Potomac. An elevation in peak temperatures and raising of temperatures of stress should be considered as cause for a shift in the population structure which will result in a decrease of desirable game species and an increase in carp and other coarse fishes. Tarzwell believes that peak summer temperatures for Ohio valley waters should not exceed 93°F. at any time or place. The author of this report believes that for Potomac populations peak water temperatures increased by unnatural means should not exceed 91°F. at any time or place, based upon study of the fish population in the river and after careful review of pertinent scientific reports. The 91°F. maximum permissible peak temperature recommended is close to the tolerance level for desirable species. Prolonged temperatures above 85°F. can be interpreted as creating unusual stress.

5. Favorable temperatures are a requirement for bass spawning success. Research by the Game and Inland Fish Commission demonstrates that spawning time of smallmouth bass is greatly influenced by the cumulative effect of water temperatures which prevail during March, April and May. Direct observations made in the River proved that male bass abandoned nests with fertilized eggs when severe temperature changes occurred. The result was loss of the progeny. The proposed high temperature discharge area is one in which spawning success now is excellent.

PART III

RECOMMENDATIONS

1. The Game and Inland Fish Commission recommends that peak water temperatures increased by unnatural means should not exceed 91°F. at any time or place below the outfall of the Potomac Electric Power Company Plant near Dickerson, Montgomery County.
2. The Commission further recommends that a comprehensive experimental type study of the proposed spoil area be made in order to describe the effect of water temperatures above 91°F. upon the natural resources of Maryland now present in this section of the Potomac River.

Attachment 2

November 24, 1959

MEMORANDUM

TO: All State Directors, Member, Southeastern
Association of Game and Fish Commissioners

FROM: Ernest A. Vaughn, Director

SUBJECT: Report to the Select Senate Committee on
National Water Resources

In accordance with the decision reached at our recent meeting in Baltimore, forwarded herewith is a copy of the brief I have filed with the Select Senate Committee on National Water Resources.

EAV:rm

The Potomac and Susquehanna River Basin authorities engulfed in conflict over fish ladders, reservoirs, transportation, water supplies and flood prevention must face the needs of the people and water managers and will have to account to the many new thirsty and hungry humans for food and drink in mind as well as body.

The challenge to water authorities in such areas of investigation as: desalting ocean water, atomic power, minimum stream flow storage, transportation, access for recreation, commercial fishing and sports fishing development, water-fowl protection, irrigation and fur management, is a 20th Century first order of business.

Maryland is a land of "pleasant living" with twenty-five per cent of its total area in fresh, brackish and salt waters. Water recreation has many facets of interest to our citizens. Studies show that over \$30,000,000 was spent by 350,000 hunters and fishermen in the Old Line State. This entailed 6,000,000 happy days in the out-of-doors in one year alone. Three out of every ten households has a hunter or fisherman.

A small craft survey shows that over 125,000 power boats ply the waters of our State, generating a commercial and sports fishing industry of great magnitude.

Many State and federal tax (license) dollars are being expended on lakes, reservoirs and small wet-lands to create more pleasure for the recreation minded public.

Studies by State and federal agencies project greater need in the future for water supply, flood control and watershed stabilization, particularly for our mushrooming populations in the Washington and Baltimore areas.

If the food and recreational needs of humanity supplied by the natural resources of fish and wildlife are to be met in the future, there must be a comprehensive plan for water development and use in which fish and wildlife managers play an active role. Programs which include sound conservation and

utilization practices as basic functions of the total program promise the maximum return. Where the role of environmental relationships is relegated to minor importance, the return can be expected to be only marginal or minimal.

Attachment 3

REPORT OF
GOVERNOR'S COMMISSION
TO STUDY
MIGRATORY BIRD LAWS

Authorized by H. J. R. 32,
1959 Session
Maryland General Assembly

RESOLUTION #2

WHEREAS, the control of mosquitoes is of utmost importance to the citizens of Maryland.

WHEREAS, the propagation of waterfowl and development of feeding grounds for waterfowl is of utmost importance to the citizens of Maryland.

NOW BE IT RESOLVED: The Department responsible for direction and administration of the Mosquito Control program in the State of Maryland investigate the control of mosquito breeding grounds by flooding rather than draining of land.

BE IT FURTHER RESOLVED: The Officials of the aforementioned department are requested to meet and confer with representatives of the Maryland Game and Inland Fish Commission to determine the practicality of flooding certain areas in the State so as to effectively control the mosquito population and also provide additional land for waterfowl production.

Attachment 4

RESOLUTION OF
SOUTHEASTERN ASSOCIATION OF
GAME AND FISH COMMISSIONERS

WHEREAS the use of pesticide chemicals are causing serious damage to our fish and wildlife and the trend towards greater use of these insecticides for the control of various pests could be disastrous to certain important wildlife species,

WHEREAS immediate action needs to be taken to prevent the disastrous results of the continued wide spread and indiscriminate application of insecticides known to be deadly poisonous to many types of life, including in some cases human beings,

BE IT RESOLVED that the Southeastern Association of Game and Fish Commissioners at its regular business meeting at Atlanta, Georgia on April 25, 1960 go on record as supporting legislation along the lines provided for in H. R. 11502. The Association urges Congress to enact this legislation. The Association although strongly favors this legislation as provided for in H. R. 11502, feels that this legislation may not be strong enough to assure the protection of our wildlife and human life from these dangerous insecticides and urges Congress to consider additional legislation either by amendments to this present Bill or by an additional Act to further safeguard our fish and wildlife resources.

ADOPTED this 25th day of April 1960, Atlanta, Georgia.

JAMES W. WEBB,
Secretary-Treasurer
SOUTHEASTERN ASSOCIATION GAME AND
FISH COMMISSIONERS

APPENDIX G

REPORT OF THE DEPARTMENT
OF FORESTS AND PARKS

One of the basic reasons for the creation of the Department was watershed management. In the first instance the State Forests were established by law to show proper practices of all forest lands, both private and public, for the maintenance of stream flow. (These references are found in Article 66C of the Code.)

The major responsibilities as prescribed by law require that the Department prevent and extinguish forest fires, enforce all laws, to regulate public and private forest lands, and to collect data relative to forest management.

The State has, in addition to the above, the responsibility, as stated in Section 342 of the Annotated Code of 1951, to purchase and manage lands in the name of the State suitable for forest culture, reserves, and watershed protection.

The present policies of the Department are to generally promote the development of private forest land to accomplish watershed protection. This is being done through intensive fire control, forest culture, and reforestation. We cooperate with Federal, other State and County organizations, both public and private, in accomplishing this end.

One of the most important problems presently confronting the Department is in trying to maintain adequate protective forest cover in all uplands, which are so important in watershed management.

The long-range objectives of the Department are mainly to provide important key protective measures to our more important lands, such as the mountains or hill areas in which our streams originate to supply water to cities and towns below. The present long-range acquisition program in stream

valley parks is also designed to secure the borders of streams for the future and for the protection of the public's interest in our waterways.

The Department is also charged with collecting information of a scientific nature regarding forest management, timber culture, water conservation and as a breeding place for fish and game. Our present research projects involve trying out new methods for improving the growth of species of trees better adapted to the type of soils we have in this region.

Plans are now under way, in cooperation with other Federal and State agencies, to meet this need through our nurseries and other means and to pass on the information so collected to the timberland owners.

Joseph F. Kaylor
Director

AttachmentSUPPLEMENTARY REPORT OF
THE DEPARTMENT OF FORESTS AND PARKS

The legislative authority and responsibilities of the Department of Forests and Parks are contained in the following legal enactments and recodification of the Laws of Maryland. The first one is the enabling clause of Section 343 of the Annotated Code of Maryland, 1951 edition, Article 66C, which states as follows:

"Forests, parks, scenic, historic and recreation areas of the State of Maryland are basic assets. Their proper use, development and preservation are necessary to protect and promote the health, safety, economic and general welfare of the people of the State. It is hereby declared to be the policy of the State to encourage the economic development and use of its natural resources for the improvement of local economy, preservation of the natural beauty and promotion of the recreational interest throughout the State.

"The Department of Forests and Parks is hereby created to promote, administer and manage all State-owned or leased forests, parks, scenic preserves, parkways, historic monuments and recreation areas, the administration of all laws, rules and regulations relating to forests, parks, scenic preserves, parkways, historic monuments and recreation areas, fire control, roadside trees, the restoration of deforested or denuded areas, and the operation of the State Forest Nursery..."

Attention here is called to the last sentence in the first paragraph and the authority which is contained in it, namely, the encouraging of economic development and the promotion of recreational interest throughout the State. The Department of Forests and Parks has a verbal opinion from the Attorney General's Office indicating that the Department is the authority in the three major fields, namely, forestry, park management and recreation areas, including the "promotion of the recreational interest throughout the State."

The next Section, 344, refers to the Commission, the Director and the administrative head of the Department. The following excerpt is from this Section:

"...The Director shall be a person with executive ability and special training and the experience in forestry, and a graduate of an accredited school of forestry. The Director shall be the administrative head of the Department, shall appoint such assistants and employees as may be provided for in the Budget, subject to the approval of the Commission and under the provision of the Merit System Law, and shall have charge of all Forest and Park Wardens in the State, aid and direct them in their work; take such action as is authorized by law to prevent and extinguish forest fires, enforce all laws, rules and regulations pertaining to public forests, scenic preserves, historic monuments, parkways, parks and recreation areas, and prosecute for any violations of such laws, rules and regulations; direct the promotion of recreation in cooperation with public and private agencies and the planning, administration and improvement of State parks, scenic preserves, historic monuments, parkways, State recreation areas, forest reserves; collect data relative to forest management; the administration of the forest conservation practices on privately-owned forest land and cooperate with landowners as described in Sections 346 and 389 to 400 inclusive of this sub-title..."

Section 345 relates to specific powers of the Department with reference to watershed protection:

"The Department of Forests and Parks shall have the power to purchase and manage lands in the name of the State, suitable for forest culture, reserves, watershed protection, State Parks, scenic preserves, historic monuments, parkways and State recreational reserves, using for such purposes any special appropriation or any surplus money not otherwise appropriated, which may be standing to the credit of the Forest Reserve or Park Reserve Fund, provided that on and after June 1, 1947...and to make all rules and regulations governing State Reserves, State Parks, scenic preserves, parkways, historic monuments and recreation areas, and to employ such labor and do such work as it deems wise in developing and protecting State Reserves under its jurisdiction; and the Governor of the State is authorized upon the recommendation of said Department of Forests and Parks to accept lands as gifts, devise or by

other means in the name of the State the same to be held protected and administered by the Department of Forests and Parks as State Parks or Reserves, and to be used so as to demonstrate the practical utility of same for recreational areas. State Parks, scenic preserves, parkways, and historic monuments, timber culture, water conservation and as a breeding place for game..."

Under Section 346, the Department has specific authority to cooperate with counties, towns and individuals in preparing plans for the protection of watersheds. The Department has engaged in this type of work for years with Commissions, Boards and Municipalities, such as, the Washington Suburban Sanitary Commission, Frederick City, Frostburg and others.

"The Director shall upon request, under the action of the Department of Forests and Parks, and whenever he deems it essential to the best interests of the people of the State, cooperate with counties, corporations and individuals in preparing plans for the protection of watersheds, management and replacement of trees, woodlots, and timber tracts, under an agreement that the parties obtaining such assistance pay at least the field expenses of the men employed in preparing said plans."

The Department's authority to enforce the laws through its field organization is contained in Section 347 with some 717 Forest and Park Wardens who serve under appointment from the Governor, who exercise authority as contained in Sections 347, 348 and 349.

From the very inception of the Department, it has had the right and power of "Eminent Domain" according to Section 372:

"The Department of Forests and Parks shall have the right and power to condemn lands, earth, gravel, stone, timber or materials, or any improvements, in the name of the State, under Article 33A, title 'Eminent Domain', of the Code of Public General Laws of Maryland as passed in Chapter 117 of the Acts of 1912 when such action is necessary for carrying out the purpose of any Legislative Act, or for advancing the aims of forestry, parks or recreation, and the work of the Department of Forests and Parks, and they may pay all costs and expenses thus incurred out of any surplus moneys standing to the credit of the Forest Reserve or Park Reserve Funds, not otherwise appropriated; nothing herein contained

shall apply to the City of Baltimore; and in connection with the project for which the lands mentioned in Section 367 of the subtitle are to be acquired, such power of condemnation shall not be exercised with respect to any lands located more than one-half mile from the medial line of the said Patapsco River, or either of its branches."

Probably the most significant power of legislation which gives the Department legislative authority and its legislative responsibilities are contained in the Forest Conservancy Act of 1943. Beginning with Sections 388 through 400 and specifically the regulations 1-2-3-4 supplemented and becoming a part of the Law through the District Forestry Board regulations, which when approved by the Commission and filed with the Clerk of the Court of Appeals, the Secretary of State and the Department of Legislative Reference in compliance with Article 41, Section 9 of the 1951 Annotated Code of Maryland, is the full force of law. For example, Sections 388, 389 and 390 read as follows:

"Forests, timberlands, woodlands and soil resources of the State of Maryland are basic assets, and the proper use, development and preservation of these resources are necessary to protect and promote the health, safety and general welfare of the people of the State. It is hereby declared to be the policy of the State to encourage economic management and scientific development of its forest and woodlands to maintain, conserve and improve the soil resources of the State to the end that an adequate source of forest products be preserved for the people. Floods and soil erosion must be prevented and the natural beauty of the State be preserved, wild life be protected, development of recreational interests be encouraged and the fertility and productivity of the soil be maintained, the impairment of reservoirs and dams be prevented, the tax rate be preserved and the welfare of the people of the State be sustained and promoted. Where such interests can be served through cooperative efforts of private forest land owners, with the assistance of the State, it is declared to be the policy of the State to encourage, assist and guide private ownership in the management and fullest economic development of such privately-owned forest lands.

Conversely, where the public interest above enumerated cannot be served and adequately protected under private ownership, it is the declared policy of the State to acquire control of and title to such lands as rapidly as financial resources of the State will permit."

"(Definitions.) In this sub-title the following definitions shall apply, unless the context clearly requires otherwise. Natural Resources shall be deemed to include forests, fish and game, water and water power, soils, minerals, and all other like sources of wealth. Woodlands or forest lands shall be construed as meaning any land of an area of three acres, or more, held by the same owner or owners, and primarily devoted to the growth of forest products. The Commission shall be deemed to refer to the Commission of Forests and Parks. The District Board shall be deemed to refer to a District Forestry Board created under the conditions of this sub-title. Land owners shall be deemed to include every person, partnership, association, corporation, estate or other party owning woodlands, located in the State and residing in the United States or foreign countries."

"(Commission of Forests and Parks.) The administration of the forest conservation practices on privately-owned forest land and the management of publicly-owned forest lands is vested in the Department of Forests and Parks. To assist that Department, as at present constituted by law, and without interfering with any of its powers and duties as heretofore established by law, the regularly constituted Forests and Parks Commission of five members is hereby empowered to administer this law. Representatives of the U. S. Forest Service and the Agricultural Extension Service may meet with such Commission in an advisory capacity. The Commission shall keep a record of its proceedings. The Commission and the District Boards hereinafter provided for, shall cooperate with existing public agencies in forest management practices, flood control, recreation, wildlife management, and related activities. The Commission of Forests and Parks shall have power to direct and coordinate the activities of the District Boards hereinafter provided for and shall have power to hear appeals from orders or decisions of such local Boards. Any person aggrieved by an order or

decision of the Commission may appeal therefrom, on matters of law, to the Circuit Court of the County in which he is a resident, or if he is a resident of Baltimore City, to the Baltimore City Court but the findings of the facts established by such Commission shall be final."

According to the preceding, the Department's responsibilities cover nearly one-half of the land area of the State, namely the forested portions.

The references to watershed protection are generally of far reaching effect, since they control and often require changes in the past method of management on the part of individuals and operators of these lands. It has been the responsibility of the Department to educate. For example, in 1944 some 2,000 warnings were given regarding the promiscuous use of fire in forest land areas, followed by a vigorous prosecution program in 1945 through the issuing of summonses to many violators of the Forest Conservancy Act of 1943.

The wardens of the Department enforce all of the laws regarding watershed management and its effect on water resource management without fear or favor. In other words, they sincerely believe in the enabling legislation and its enforcement. Likewise in Section 388 the development of recreational interests are being encouraged throughout the State by virtue of our around the clock protection of forest and soil resources.

Due to the fact that the administration of forest conservation practices plays such an important part in watershed management, the Department has cooperated with many agencies in co-ordinating the activities of the District Forestry Boards. These Boards made up of five local citizens close to the seat of activities, have given the problems surrounding private land administration many hours of free service in keeping the forested lands on our watersheds productive, attractive and of service to our taxpayers. The Board members have been alert and anxious to serve the citizens of their District or County and State in seeing that any special rulings which were handed down carried the necessary safeguards to protect the uplands at any given watershed from seriously affecting the water holding capacity within that watershed.

The Department's present policies and programs are in two major fields, namely, forest management and park or recreation area acquisition and development. The policies relating to recreation are interdependent on water resource management. Numerous areas in State ownership call for adherence to strict standards of operation to afford the utmost recreation for visitors to park and recreation sites. In fact, this creates problems because most of the areas are designed to carry a given number of visitors, and the actual number of visitations have in many instances increased to three times the stated capacity of the area. The respective programs in forestry include one of the most intensive and highly mechanized forest fire control programs in the country. This was found to be necessary due to the increasing concentration of people and to the multiple uses of land such as any wooded tract can provide in a given period. These activities include thousands of acres of private land on which hunting, fishing, hiking, camping and other outdoor recreation activities are permitted. In the hunting and fishing phases, the Department officials and personnel have cooperated very closely with the Department of Game and Inland Fish in promoting hunting activities on not only State forest lands but on other properties as well.

An effective program of fire control has made it possible to increase the number of activities despite the pyramiding numbers of people.

In other phases of forest management, tree planting, wildlife shrub planting and in general woods improvement to provide better food and cover for game birds and animals has been most effectively worked out in cooperation with the responsible agencies in this field. Federal cooperative activities with the Interstate Commission on the Potomac River Basin, of which the Director of the Department was chairman of the Land Committee for a number of years, and is now Governor Tawes' alternate on the Commission both with the U. S. Corps of Engineers and the Upper Potomac Commission in the management of the reservoir

at Savage River, which is surrounded by the Savage River State Forest, are prime examples of the Department's activities in Federal, State and quasi-public operations which provide benefits to a number of industries and many individuals. It has been said many times, that without the good management of our Savage River State Forest and the resultant maintenance of adequate stream flow into the Savage Reservoir, the 60 million gallons a day which the West Virginia Pulp and Paper Company takes to turn the wheels employing 2,600 persons daily, would not be possible.

In our minds, this example of cooperation where the State owns the land surrounding the impoundment and the State protects or provides good water resource management, should be duplicated in every major tributary of the Potomac River Basin and other major rivers or bays in Maryland. More will be said regarding this phase of water resource management later.

It is not considered possible to have a good water resource management program unless the State or some public agency has ownership and control of the lands surrounding impoundments which are of high economic and recreational value. In the administration of the Department, we have facilities available for both intensive and extensive land acquisition programs in practically every section of the State. The acquisition of Forests and Parks properties has been one of the major responsibilities of the Department since its inception. It has a field organization of four districts, namely, Cumberland, Laurel, Bel Air and Salisbury. In each of these district setups, trained professional personnel is available to carry on a program of acquisition, development and administration for good forest management and as a result, good water resource management.

The Department at the direction of the special Potomac River Committee of the Legislative Council, within the past year developed a preliminary study plan to acquire lands on the major tributaries of the Potomac River Basin from Garrett to St. Mary's County. This program called for the acquisition of land

and the impoundment of water, which would be available for either of the four major users of water, namely, municipalities, industry, agriculture and recreation.

The Department is vitally concerned regarding the misuse of our river valleys, and believes that with a little additional technical help it is equipped to do a good management job of our water resources to meet emerging problems in all of the tributaries mentioned above.

One of the greatest assets Maryland could have would be an abundant water supply to offer industry in meeting the water needs for the next ten years. In fact, in some areas the present problem is not being recognized by public officials and is in need of immediate attention.

The long-range objectives of the Department are closely tied in with the next 25 and the next 40 years, mainly on the basis of the needs of the citizens of this State in wholesome pursuits of their leisure time. The Department sincerely believes that one of the greatest uses of our lands that will remain in forest cover within the 1985 to the year 2000 period, will be to offer greater opportunities for outdoor recreation of the highest order, than would be their alternative values as strictly lands producing wood fiber. We are of the opinion that the objectives of this State should be pointed toward the acquisition of at least 50,000 acres of land, mainly in important watersheds and along the stream valleys of some 13 watersheds and the tributaries of the Potomac, in which a development of the water resources will provide our future citizens with an assured long-range program of water supply. This program can be carried on most effectively with counties and other agencies of the State in providing an adequate base for cooperation with agencies of the Federal Government such as the Corps of Engineers. It is our firm belief that it should be the State's policy to acquire these lands and an impounded zone surrounding the important areas for protection of the investment in order that

the State can attract industry, supply water based recreation and meet the competition of other states north, south or west, where inducements are being given to lucrative industries with good payrolls and an attractive tax base based primarily on the fact that a water supply is available.

The Department of Forests and Parks has discussed at frequent intervals the need for legislative or at least administrative action to place the program above mentioned in action. The Department believes that there are ample facilities available to do a sound job in land acquisition and management if the necessary funds are made available. It is estimated that an initial ten million dollar bond issue, at least, should be started on a ten year program with one million dollars a year available so that rapid strides could be made in all fields of water resource management.

The Department's research efforts have been largely in cooperation with the Department of Research and Education. Its planning has been generally through the Planning Department, although there have been a number of projects which have been developed in the Department which are, for example, like the program of land acquisition and impoundments on the tributaries of the Potomac that have not been given widespread publicity.

The Department has a plan underway to study the impact of land and water as related to the competing uses of the visitors, owners and operators of both public and private lands. Such a study is required in assessing the long-range needs of competing users and in the formulation of a detailed water-oriented recreation program.

Joseph F. Kaylor
Director

APPENDIX H

REPORT OF THE DEPARTMENT
OF RESEARCH AND EDUCATION

Legislative Authority and Responsibilities

The following excerpts, originally passed in the Acts of 1941, include pertinent legislation:

DEPARTMENT OF RESEARCH AND EDUCATION

Ch. 508, Sec. 12D-12G, Acts of 1941

Art. 19A Annotated Code, 1943 Supplement

Section 12D. THE COMMISSION OF RESEARCH AND EDUCATION.

The Department of Research and Education is hereby created to exercise the present functions of the Chesapeake Biological Laboratory and the Maryland Weather Service, and to develop a comprehensive research and educational program covering all the natural resources of the State.

Section 12F. POWERS AND DUTIES OF THE COMMISSION. The Commission shall exercise general supervision over all matters pertaining to the following:

(1) Research

(b) Investigations of the waters of the State as to their capacity to maintain and develop fish life, including the problems of hatchery, planting and rearing of fish.

(f) Studies of pollution and its control in both tidal and non-tidal water.

(2) Education

(b) Presentation to the public, on a full-time basis, of a systematic program of instruction by means of lectures, motion pictures, articles and other methods of publicity.

This program should include the dissemination of effective factual information on what is happening to the State's natural resources, what wasteful practices are being pursued, and what possible remedies there may be for improving present conditions. This program should also include the dissemination of active factual information as to the nutritive food values of seafood.

This Department does not administer or directly manage water or other resources of the State. In general, our responsibility is broad in the fields of research and conservation education, but limited to those fields.

Other portions of the Maryland Law place the Director of this Department on several boards and commissions in an ex officio capacity.^{1/} These somewhat broaden the total responsibility of the Department, as outlined below.

Present Policies and Programs

The policies and programs relating to research are deferred to the final section of this report.

The Department's Conservation Education program includes preparation of educational materials (e.g., MARYLAND LIVING WATERS) and organization of a variety of training sessions and workshops for teachers, various citizen groups and others in the field of natural resources. Material is always included on the water resources of the State and we usually draw from pertinent Federal and State agencies to assist in the effective presentation of this material.

^{1/} Ex officio and appointive functions of the Department include participation in the following:

Board of Natural Resources; Water Pollution Control Commission; Interstate Commission on the Potomac River Basin; Atlantic States Marine Fisheries Commission (Advisor); Committee for the Water Quality Survey and Study Section (Survey Advisor), established by the Water Pollution Control Commission and the State Department of Health; Cooperative Study of the Effects of Hydroelectric Generation Operation on the Potomac River (Special Committee).

The Conservation Education program is conducted under a Division of this Department. The staff is extremely small, but effectively supplemented by generous cooperation from other State and Federal groups. Ex officio and appointive activities are principally conducted by the Director of the Department.

Present and Emerging Problems

Specific research needs relating to the supply and quality of water will be continuously changing in response to the interplay between those who use water and the responsible State agencies. It is difficult to predict precisely the research needs of the future, but the following problems will certainly be included:

1. adequate detection of radioactive waste and development of minimizing damage to human interests
2. comprehension of the waste materials added to natural water by industrial and domestic sources, and development of methods of permanently preventing excessive damage
3. effects of plankton blooms and other biological activity on water quality
4. refined understanding of the effects of various uses of fresh water on the Chesapeake and its contained resources
5. increased knowledge of the availability and quality of surface and underground waters for human use

In addition to these relatively specific problems, the increasing and highly varied uses made of Maryland's waters will demand simultaneous estimates of many factors which cannot yet be fully comprehended. Research will be essential on many specific questions and on the broad patterns of pollution, flushing rates, annual variation in supply, etc.

Long-Range Objectives and Program Goals

A recent development of statement of goals briefly describes the long-range objectives of the Department:

1. to provide facts and understanding of the natural resources for the benefit of management agencies
2. to assist in the education of every child in Maryland, and so far as possible his parents, on the concepts on conservation

Specific research projects will be modified annually, in response to expressed needs by other State departments and to the emergence of new problems as the result of research. It is fully recognized that many or all of the problems expected in Maryland are faced by other states and by the Federal Government, so that the specific research efforts of Maryland should complement the work done by others to assure solution of our local needs.

In general, the present broad role of the Department of Research and Education is considered to have an excellent potential. The research program of the Department responds to the needs of many different agencies and frequently serves to integrate some of the work of those agencies.

There appears to be an excessive number of agencies involved in water resources development, protection and management. The present study by the State Planning Department and the U. S. Public Health Service may provide an excellent medium for effective unification of these functions. This could take the form of administrative unification or of fully effective cooperation and coordination. We present no brief for either argument, but re-emphasize the necessity for accomplishing the objectives of adequate water supply and permanent balanced use of that supply.

Data Collecting and Research

The Department's program is principally concerned with biological research for the protection and improvement of Maryland's resources. The

following summary assumes that this report is to be concerned only with water supply, quality and use.

A. Data collecting

1. Routine observations contributing to State-wide or Nation-wide data pools:
 - (a) operation of a Coast and Geodetic Survey tide station at the Chesapeake Biological Laboratory, Solomons, Maryland
 - (b) routine sampling of salinity, temperature, oxygen, etc., at most of our research stations in the Chesapeake Bay and its tributaries
 - (c) through the Chesapeake Bay Institute, periodic and special sampling of the conditions present in the Chesapeake Bay and its tributaries
 - (d) incidental scattered observations on the temperature, turbidity, and other characteristics of various inland waters

B. Current and projected research

1. Past studies

(Observations on water and its characteristics have accompanied many of our research projects in the past. In addition, certain specific publications have been issued dealing with water resources.)

- (a) "Oxygen-Poor waters of the Chesapeake Bay." Newcombe, C. L. and William A. Horne, SCIENCE, Vol. 88, 1938. Contr. No. 19, Ches. Biol. Lab.
- (b) "Studies on the Physics and Chemistry of Estuarine Waters in Chesapeake Bay." Newcombe, Curtis L., William A. Horne and Boland B. Shepherd, JOURN. MAR. RES., Vol. II, 1939. Contr. 21 Ches. Biol. Lab.
- (c) "The Distribution of Phosphates in the Chesapeake Bay." Newcombe, Curtis L. and Andrew G. Lang, PRO., AM. PHIL. SOC., Vol. 81, 1939. Contr. No. 28, Ches. Biol. Lab.
- (d) "Variations in the Phosphorus Content of Estuarine Waters of the Chesapeake Bay--Near Solomons Island, Maryland." Newcombe, C. L. and H. F. Brust, JOUR. MAR. RES., Vol. III, 1940. Contr. No. 32, Ches. Biol. Lab.
- (e) "Observations on the Alkalinity of Estuarine Waters of the Chesapeake Bay near Solomons Island, Maryland." Brust, Harry F. and C. L. Newcombe, JOUR. MAR. RES., Vol. III, 1940. Contr. No. 38, Ches. Biol. Lab.

- (f) "Studies of the Effects of Industrial Pollution in the Lower Patapsco River Area." Olson, R. A., 1941. Contr. No. 43, Ches. Biol. Lab.
- (g) "A Rapid Response Thermocouple Unit of High Sensitivity for the Determination of Temperature Stratification in Natural Waters." Olson, R. A., 1941. Contr. No. 45, Ches. Biol. Lab.
- (h) "Environmental Characteristics of a River Estuary." Nash, Carroll B., 1947. JOUR. MAR. RES., Vol. VI, No. 3, Contr. No. 64, Ches. Biol. Lab.
- (i) "Effect of Susquehanna River Stream Flow on Chesapeake Bay Salinities and History of Past Oyster Mortalities on Upper Bay Bars." Beaven, G. Francis, 1947. Contr. No. 68, Ches. Biol. Lab.
- (j) "Studies of the Effects of Industrial Pollution in the Lower Patapsco River Area." "The Effect of Copperas Pollution on Plankton." Davis, Charles, C., 1948. Contr. No. 72, Ches. Biol. Lab.
- (k) "A Study of Water Quality in Baltimore Harbor." Garland, Chesley F., 1952. Contr. No. 96. Ches. Biol. Lab.
- (l) "Maryland Freshwater Stream Classification by Watersheds." Van Deusen, R. D., 1954. Contr. No. 106, Ches. Biol. Lab.
- (m) "Maryland Stream Flow Records." Singewald, J. T., Jr., 1945. Edu. Series No. 9, Ches. Biol. Lab.
- (n) "Ground Water in the Baltimore Area, Maryland." Bennett, Robert R., 1946. Edu. Series No. 13, Ches. Biol. Lab.

A long series of research papers, data reports and other publications has been completed by the Chesapeake Bay Institute under contracts supported by this Department. Since 1948, this contract program has been a very productive supplement to our own studies.

Present projects specifically related to water resources include the following:

1. Under contract to this Department, the Chesapeake Bay Institute of the Johns Hopkins University is conducting a three-year study of the Baltimore Harbor. This study, supported by funds from industry, the Federal Government (through the State Health Department and the Water Pollution Control Commission), and general funds of this Department, is directed toward understanding of the renewal rate of the Harbor and, eventually, the capacity of the Harbor to receive waste without undue damage to adjacent areas and other users.

2. Under a contract with this Department, the Chesapeake Bay Institute is completing the study of the characteristics and circulation of waters at Conowingo Reservoir of the lower Susquehanna River. It is highly pertinent that the Susquehanna is Maryland's greatest single source of fresh water and that it dominates the circulation pattern, salinity and other characteristics of the entire upper Chesapeake and many of its tributaries.
3. Most of the research projects of the Chesapeake Biological Laboratory involve the relationship between natural waters and/or organisms which live in them. It would be superfluous to list all of our biological projects on fish, crabs, oysters, clams, etc., at this point, although each will contribute to understanding of Maryland's waters.

It seems probable that the following research problems will be attacked by this Department in the future:

1. the specific effects of pollutants on aquatic organisms, including radioactive wastes
2. the adequacy of certain water bodies or areas for specific uses (domestic, industrial, recreational, etc.)
3. the causes of massive mortalities of fish in the Chesapeake Bay area, probably in cooperation with the Chesapeake Bay Institute
4. special studies suggested or requested by the Water Pollution Control Commission, the Department of Geology, Mines and Water Resources, the State Health Department, or others

APPENDIX I

REPORT OF THE EXTENSION SERVICE
OF THE COLLEGE OF AGRICULTURE,
UNIVERSITY OF MARYLAND

Soil Conservation Districts

Enabling legislation was enacted in 1937 and it now appears in Article 66C, Sections 88 - 103, inclusive, of the 1957 Code of Maryland Laws. This legislation authorizes the creation of Soil Conservation Districts for the purpose of encouraging landowners to establish soil and water conservation measures on their property as well as other measures for the conservation of natural resources.

The prevention of soil erosion is essential to the preservation of the State's natural resources, control of floods, prevention of damage to dams and reservoirs, maintenance of the navigability of rivers and harbors, preservation of wildlife, protection of the tax base, protection of public lands, and protection and promotion of the health, safety, and general welfare of the people of the State.

The first Soil Conservation District was created under the law in 1938. There are now twenty-four (24) Soil Conservation Districts in the State, the last one was created in 1958. All the farm land in the State is included in one of these twenty-four Soil Conservation Districts.

The Soil Conservation Districts Law creates the State Soil Conservation Committee, which has numerous duties and responsibilities in connection with the Soil Conservation District program.

The Soil Conservation Service, of the United States Department of Agriculture, supplies technical assistance to Soil Conservation Districts in the State. The Soil Conservation Service and the Extension Service supply technicians for designing and for supervising construction of farm ponds built

for the storage of water. A high percentage of the farm ponds built in the State have been recommended and designed by the technicians of the Soil Conservation Service, who are made available to Soil Conservation Districts.

Soil Conservation Districts have been acting as a sponsoring organization for Watershed Associations organized to take advantage of the provisions of the Watershed Protection and Flood Prevention Act (PL 566 as amended).

Soil Conservation Districts will continue to promote a sound soil and water conservation program in the State.

Public Drainage Associations

Enacted in 1941 with amendments in 1949 and 1959, the law now appears in Article 25, County Commissioners, under Sections 52 - 122, inclusive of the 1957 Code of Maryland Laws. The law authorizes the creation of Public Drainage Associations with authority to locate and establish ditches, drains, or canals, and to cause to be constructed, straightened, widened or deepened any ditch, drain or water course for the purpose of draining wet, swampy, or overflowed lands or lands subject to overflow.

Landowners in a contiguous area of wet, swampy or overflowed lands file a petition with the Board of County Commissioners requesting the creation of a Public Drainage Association. A large number of these Public Drainage Associations have been created in the counties on the Eastern Shore of Maryland. The costs of drainage projects are paid by the landowners benefited and their land may be, and usually is, taxed for its share of the cost. Since drainage often benefits public roads and increases the value of land in the county (and, consequently, protects and increases the tax base), County Commissioners sometimes make contributions to the "Tax Ditch Program."

Technicians of the Extension Service of the College of Agriculture, University of Maryland, and the Soil Conservation Service, United States

Department of Agriculture, assist in the organization of Public Drainage Associations and provide engineering assistance for designs, lay out, and construction. New Public Drainage Associations are being created from time to time. The law will continue to be used in the future since there are still large areas of improperly drained land on the Eastern Shore of the State.

Public Watershed Associations

Enabling Legislation was enacted by the General Assembly in 1959 as Senate Bill 366 and appears as Chapter 588 of the 1959 Laws of Maryland. This legislation now appears in Article 25, Sections 169-218, inclusive of the 1959 Cumulative Supplement to the 1957 Code of Maryland Laws. The law authorizes the creation of Public Watershed Associations for the purpose of carrying out works of improvement for flood prevention or for the conservation, development, utilization and disposal of water in watersheds and sub-watershed areas.

Associations created under this act have the authority needed to carry out the provisions of the Watershed Protection and Flood Prevention Act (PL-566 as amended). It is available to local people who decide to organize and carry out works of improvement which cannot be accomplished by an individual working alone.

Local people in several counties are presently making use of this legislation and people in other areas will be using it in the future.

Maryland Water Study Commission

This Commission was appointed by the Governor in compliance with House Joint Resolution 31 enacted at the 1959 session of the Maryland General Assembly. Responsibilities of the Commission are to study the economic development problems related to water uses and to give consideration to any legislation needed to clarify water rights as they may be related to such development in the State.

The Commission has committees at work assembling data relative to the following:

1. water resources of Maryland
2. water uses in Maryland other than agriculture with projections as to future needs
3. use of water for irrigation with projections as to future needs
4. problems that have arisen, or might be anticipated to arise, in connection with water use

After the committees have assembled data and made reports, a legislative committee is to be appointed to consider the need for legislation.

The committees on the use of water for irrigation and on water problems have completed their work and reported to the Commission. The committee on present water uses with projections as to future use has reported that a somewhat detailed study is needed and has requested that funds be made available for use in making this study. The proposed study will probably be conducted under the supervision of an existing state agency.

APPENDIX J

BRIEF HISTORY OF STATE AGENCIES
WITH MAJOR WATER RESOURCES
MANAGEMENT RESPONSIBILITIESDepartment of Geology, Mines
and Water Resources

In 1896, the General Assembly authorized the creation of a State Geological and State Economical Survey with broad authority to conduct studies and surveys relative to the natural resources of the State.^{1/} As a part of a general reorganization of State government in 1922, the General Assembly brought the Geological and Economical Survey under the control of the Board of Regents of the University of Maryland and authorized the creation of the Maryland Bureau of Mines.^{2/} Two additional agencies subsequently were created by the General Assembly, the Water Front Commission, in 1929,^{3/} and the Water Resources Commission, in 1933.^{4/} The State Geological and Economical Survey was detached from the University of Maryland and merged with the Bureau of Mines, the Water Front Commission and the Water Resources Commission in 1941 to form the present Department of Geology, Mines and Water Resources.^{5/}

The Department continues under the same organization established in 1941, with headquarters in Latrobe Hall on the Johns Hopkins University Campus. Though the Bureau of Mines by law is a part of the Department of Geology, Mines and Water Resources, the Bureau is located in Westernport. The Bureau maintains a separate budget and staff, and for all practical purposes, is an independent State agency. The Bureau of Mines is concerned primarily with bituminous coal in Allegany and Garrett Counties, though the Bureau also collects figures on the

^{1/} Laws of Maryland of 1896, Chapter 51.

^{2/} Laws of Maryland of 1922, Chapters 29 and 307.

^{3/} Laws of Maryland of 1929, Chapter 322.

^{4/} Laws of Maryland of 1933, Chapter 526.

^{5/} Laws of Maryland of 1941, Chapter 508.

production of fire clay in that area. Neither the Department nor Bureau publish figures on other mineral products, though the market value of minerals produced in Maryland far exceed the value of any other natural resource of the State.

Department of Research and Education

As early as 1919, Dr. R. V. Truitt began for the U. S. Bureau of Fisheries a series of investigations on the oyster industry of Maryland. He later joined the faculty of the University of Maryland, but was encouraged by the Conservation Department to continue his interest in the oyster problems of the State. About 1924, the Vestry of the Episcopal Church at Solomons offered Dr. Truitt the facilities of the Parrish House as a field station for the study of the oyster. With only temporary and inadequate facilities, the studies initiated at Solomons were conducted chiefly during the summer months. As a result of the enthusiastic interest manifest by Dr. Truitt's students, the Conservation Department supplied boats, equipment and financial encouragement for these studies. In 1929, through the joint efforts of Dr. Truitt and the Conservation Department, the General Assembly appropriated funds for a site and a laboratory building at Solomons. The building was dedicated in the summer of 1932.

The new marine laboratory at Solomons created an interest in marine research among colleges and universities. Dr. Truitt and the Conservation Department encouraged this interest, and each summer for several years students and independent investigators arrived at the laboratory to study or to undertake research in marine biology. Students earned undergraduate or graduate credit in courses taught at the laboratory. In 1938, a dormitory building, including a dining hall, was constructed near the laboratory, and the Chesapeake Biological Laboratory became a small State institution operating during the summer.

In 1941, the conservation agencies of the State were reorganized and the Chesapeake Biological Laboratory became by law the Department of Research

and Education, to be administered by an unsalaried five-man commission.^{1/}

Shortly thereafter, Dr. R. V. Truitt severed his connection with the University of Maryland and was appointed Director of the new Department of Research and Education. Since 1942, the Department has gradually expanded its activities and has remained active throughout the year.

While the Department is authorized by law to conduct scientific investigations in connection with all the natural resources of the State, it has as a matter of practice concentrated mainly on fisheries research. When shortly after 1942 the State of Maryland, the Commonwealth of Virginia, and the U. S. Navy, joined in the establishment of the Chesapeake Bay Institute at Johns Hopkins University, the Department abandoned the hydrographic studies it had earlier initiated, and has ever since transferred to the Chesapeake Bay institute \$30,000 appropriated to the Department annually for such research.

In 1951, the Department established a substation at Public Landing on Chincoteague Bay in Worcester County; in 1958, the staff concerned with game, forestry, and fresh-water fish was removed to the State Office Building in Annapolis. However, most of the staff remained at Solomons, and an additional laboratory building there was completed in 1960. The staff of the Department is thus divided unequally between three geographic points, Public Landing, Annapolis, and Solomons.

Department of Tidewater Fisheries

Though known to be abundant, Maryland's oyster production in 1860 totaled only three million bushels. After the Civil War, Maryland oyster men learned to make dredges, which were cast and hauled from sailboats, and by 1885 production reached fifteen million bushels. With the rapid growth of the industry, law violations became a problem, and in 1868, the General Assembly established

^{1/} Laws of Maryland of 1941, Chapter 508.

the State Oyster Police Force, under the supervision of the Board of Public Works.^{1/} In 1894, the Oyster Police Force was slightly reorganized and became known as the State Fishery Force.^{2/} Meanwhile, interest in commercial fish had grown, and in 1874, the General Assembly created the Commission of Fisheries,^{3/} which had no administrative connection with either the State Oyster Police Force or its successor, the State Fishery Force.

Early in the twentieth century, it became clear that the oyster resources of the Chesapeake Bay were rapidly declining, and in 1906, the General Assembly created a Board of Shellfish Commissioners, which was also independent of the State Fishery Force and the Commission of Fisheries. The Board of Shellfish Commissioners, generally called the Shellfish Commission, was created primarily to survey and mark out the natural oyster bars of the State so that the areas barren of oysters could be leased for private oyster culture. In cooperation with the U. S. Coast and Geodetic Survey, the Shellfish Commission between 1906 and 1912 made perhaps the most complete oyster survey ever made. Previously, however, there had been general dissatisfaction with the manner in which local sheriffs and constables enforced the game laws of the State, and as a result the General Assembly, in 1896, provided for a State Game Warden.^{4/} In 1910, the State found itself with a Shellfish Commission, a State Fishery Force, a Commission of Fisheries and a State Game Warden, all operating independently. Accordingly, the General Assembly in 1910 created a State Conservation Bureau for the purpose of coordinating the activities of these agencies.^{5/} Lacking authority and with only a token appropriation, the new Bureau appears to have been completely inactive.

^{1/} Laws of Maryland of 1868, Chapter 406.

^{2/} Laws of Maryland of 1894, Chapter 380.

^{3/} Laws of Maryland of 1874, Chapter 150.

^{4/} Laws of Maryland of 1896, Chapter 293.

^{5/} Laws of Maryland of 1910, Chapter 238.

In 1916, the General Assembly abolished both the Commission of Fisheries and the Board of Shellfish Commissioners and established a Conservation Commission, which was to have general control over oysters, fish, shellfish, game, and fur bearing animals.^{1/} The newly-formed Conservation Commission thus brought into one agency, the activities of the Game Warden, the Commission of Fisheries, the State Fishery Force, and the Shellfish Commission. In 1922, in the general reorganization of State agencies, the Conservation Commission became the Conservation Department.^{2/} The Conservation Department persisted until 1939 when the functions relating to fresh-water fish, game and fur bearing animals were disassociated from the Conservation Department and established in a new agency, the Game and Inland Fish Commission.^{3/}

As a consequence of the general reorganization of Conservation Agencies in 1941, the Conservation Department and the Game and Inland Fish Commission became the Department of Tidewater Fisheries and the Department of Game and Inland Fish,^{4/} and both became member departments of the Board of Natural Resources. In 1959, the internal organization of the Department of Tidewater Fisheries was changed, but its jurisdiction remained substantially the same.^{5/}

Water Pollution Control Commission

After the reorganization of conservation agencies in 1941, controls over water pollution were divided among a number of State agencies. The State Department of Health was responsible for those forms of pollution which menace health or which create a nuisance; the Department of Tidewater Fisheries and the Department of Game and Inland Fish were responsible for controlling pollution which might affect fish or shellfish; the Department of Research and Education

^{1/} Laws of Maryland of 1916, Chapter 682.

^{2/} Laws of Maryland of 1922, Chapter 29.

^{3/} Laws of Maryland of 1939, Chapter 354.

^{4/} Laws of Maryland of 1941, Chapter 508.

^{5/} Laws of Maryland of 1959, Chapter 430.

was responsible for scientific investigations relative to pollution.

It was soon apparent that this division of responsibility for pollution control was unsatisfactory, and in 1945, the Board of Natural Resources, in co-operation with representatives from the General Assembly and sportsmen's organizations, embarked upon a thorough study of existing controls over water pollution.^{1/} Following the completion of the study, the General Assembly set up a special temporary committee under the direction of Dr. S. S. Steinberg, Dean of the College of Engineering of the University of Maryland, to prepare legislation for the 1947 session. In response to the recommendations of this committee, the General Assembly approved the creation of the Water Pollution Control Commission.^{2/}

With the creation of the Water Pollution Control Commission, other conservation agencies surrendered their authority in this field leaving the responsibility divided between the State Health Department and the Water Pollution Control Commission. To avoid possible conflicts growing out of overlapping authority, the two agencies have agreed that the Health Department will confine its pollution control activities primarily to those forms of pollution which menace health and the Water Pollution Control Commission primarily to those forms of pollution injurious to aquatic life or otherwise detrimental to the water resources of the State. Acceptance of this manner of sharing controls over water pollution is reflected in the annual budgets of the two agencies.

Department of Health -
Bureau of Environmental Hygiene

As a result of the reorganization of the State Department of Health in 1951, the various Bureaus and Divisions of the Department concerned with environmental hygiene control were brought under the jurisdiction of the Bureau of Environmental Hygiene.

^{1/} For the results of this study, see the 1945 Annual Report of the Board of Natural Resources, pp. 71-77.

^{2/} Laws of Maryland of 1947, Chapter 697.

Shortly after the turn of the century the State Board of Health, through appropriate State legislative action, created the regulatory Bureaus which subsequently were consolidated into the Bureau of Environmental Hygiene.

The Bureau of Food and Drug Control was created by the General Assembly in 1910. For many years it operated as two distinct functions administered by two separate heads, one by a registered pharmacist, the other by a person experienced in food control. Under the 1951 reorganization, the Bureau was divided into two Divisions, the Division of Drug Control and the Division of Food Control, and both were placed under the Bureau of Environmental Hygiene.

The Bureau of Sanitary Engineering was created by legislative act in 1914, and remained a separate bureau until the 1951 reorganization, at which time it was brought under the Bureau of Environmental Hygiene as the Division of Sanitary Engineering.

The Division of Occupational Health was created by action of the State Board of Health in 1940. The original name was Division of Industrial Health, but this was changed to Division of Industrial Health and Air Pollution in 1950 when control over air pollution was added. With still further responsibilities, the Division was finally renamed the Division of Occupational Health. The Division's major branches of activity are industrial health, radiation control, air quality control and bedding and upholstery control. Originally a separate division established in 1930, bedding and upholstery control was brought under the Division of Occupational Health in 1958.

In 1957, the Bureau of Environmental Hygiene added to its operations a section concerned with the hygiene of migrant labor camps. This section recently has developed regulations governing such housing for State-wide control.

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MARYLAND POPULATION 1930-1960

BY ELECTION DISTRICTS, CITIES AND TOWNS

MARYLAND STATE PLANNING DEPARTMENT